Atari800MacX Manual

Version 3.5

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1. Getting Started

Welcome to Atari800MacX , the Atari 800/XL/XE/5200 emulator for Macintosh OSX. This getting started section is intended to help those who are new to Atari Emulation get started quickly. Experienced emulator users should also give this section a quick read to help you get familiar with some of the special features of the Mac version.

Donationware

The emulator is released under the GPL license, however many months/years of work have gone into it. If you use and appreciate the emulator, please donate to its development. You can do this by clicking on the menu item Donation... under the Atari800MacX menu.

OS Roms

The emulator requires that you have ROM images for the Atari operating system and the BASIC language ROM. These files are not provided with the emulator for legal reasons, but they are widely available on the internet. The default names for the ROMS are atariosa.rom, atariosb.rom, atarixl.rom, ataribas.rom, and a5200.rom. By default, the emulator expects the ROM files to be found in the OSRoms folder in the Atari800MacX folder. You can select files with different names or in different locations by using the Roms Tab (section 5.6) of the Preferences window.

Starting the Emulator

Once the emulator is started, with the ROM files properly installed, you should see a Blue Screen with white letters in the emulator with the Atari BASIC ready prompt.

The first thing you will probably want to do is adjust the display to your liking. There are many options for the Display characteristics some of which can be accessed from the Display Menu (section 6.2), and others which are available from the Display Tab (section 5.1) of the Preferences window. While we are on the topic, please take time to read through all of the documentation on the Preferences window (section 5). You can open the Preferences window from the Preferences menu item in the Atari800MacX menu, or by pressing the command and comma keys. There are many, many options available in this emulator, and almost everything you can think of can be customized.

OK, now you have the emulator up and running, you probably would like to do something besides seeing the BASIC READY prompt, correct? The emulator is capable of supporting Atari programs on cartridge, disk, and cassette image files. To use these files, you can open them by the menu items in the Media Menu (section 6.1) , or through the controls in the Media Status Window (section 4.). You can also drag and drop the files onto the main emulator window, although if it is a disk image, it will always be put in drive 1. For a full list of the file types and extensions supported by the emulator, please see File Types (section 11.).

Finally, I suspect that you would like to simulate the controllers you used to play those great Atari games. The emulator allows you to use the keyboard, mouse, and USB gamepads/joysticks to do this. To find out all of the details, please see the Controllers and Gamepads Tabs (sections 5.8 and 5.9) in the Preferences window.

What happens if the Emulated Atari crashes?

If the emulated Atari crashes, due to an illegal instruction, etc., the emulator will display an Unrecoverable Error dialog. This normally happens because of a corrupt disk or cartridge image, or one that is used incorrectly. (It could happen if your OS ROM images are bad also). Instead of locking up, the way a real Atari would, the emulator gives you a choice or removing the media, performing a warm or cold reset, entering the debug monitor, or simply quitting the emulator. The Unrecoverable Error Dialog is show below, in both the Windowed and Fullscreen versions.

Atari800MacX Error
Unrecoverable Error
The Atari800MacX Emulator has detected an unrecoverable error. Please select ColdStart or WarmStart to attempt restart, Monitor to enter monitor, Eject to eject Cartridge or Boot Disk, or Quit to exit the emulator
Quit Emulator
Monitor
ColdStart
WarmStart
Eject Cartridge
Eject Disk 1

Unrecoverable Error
The Atari800MacX Emulator had detected an unrecoverable error. Please select ColdStart or WarmStart to attempt restart, Monitor to enter the monitor, Eject to eject Cartridge or Boot Disk, or Quit to exit the emulator._
Quit Emulator
Monitor
ColdStart
WarmStart
Eject Cartridge
Eject Disk 1

What's New in 3.4?

Features Added/Changed:

- Added support for the new SpartDos X 128K Cartridge.
- Added menu to the Control Menu to allow the user to control the artifacting mode.
- Allow gamepads with 3 joysticks of the same type to be used (Gravis Eliminator Aftershock is an example).

Bugs Fixed:

- Fixed issue with "new" artifacting in certain games, such as SCRAM.
- Fixed issue where Artifacting mode was not taking effect until program was restarted (After being set in Media Status Window)..

2. Features

The Atari800MacX inherits most all of the features of the Atari800 emulator, while adding Mac specific enhancements and features.
Features Inherited from Atari800

- Emulation of Atari 400, 800, 600 XL, 800XL, 130XE, 5200 Games System.
- 130XE compatible memory expansions: 320K, 576K, 1088K.
- Optional 4K RAM between 0xc000 and 0xcfff in 400/800 mode.
- Cycle-exact 6502 emulation, all unofficial instructions.
- Cycle-exact NMI interrupts, scanline-based POKEY interrupts.
- Cycle-exact ANTIC emulation, all display modes, precise timing.
- Player/Missile Graphics, exact priority control and collision detection.
- Exact POKEY shift registers (sound and random number generator).
- 8 disk drives, emulated at computer-to-drive communication and fast patched SIO levels.
- ATR, XFD, DCM, ATR.GZ and XFD.GZ disk images.
- Direct loading of Atari executable files.
- 42 cartridge types, raw and CART format.
- Cassette player, raw and CAS images.
- Files can be stored directly on your host computer via the H: device.
- Current emulation state can be saved in a state file.
- Sound support.
- Stereo (two POKEYs) emulation.
- Joystick controller using numeric keypad.
- Real joystick support.
- Paddles, Atari touch tablet, Koala pad, light pen, light gun, ST/Amiga mouse, Atari trak-ball, joystick and Atari 5200 analog controller emulated using mouse.
- R-Time 8 emulation using host computer clock.
- Sound output may be written to WAV files
- Printer support.
- Atari palette read from a file or calculated basing on user-defined parameters.

The Enhancements in Atari800MacX are

- Ability to display the Atari Screen in 2x, 3x, and 4x and Fullscreen modes.
- Fullscreen and Windowed modes.
- Screen snapshots saved to TIFF files.
- Support of Macintosh Joystick/Gamepad devices.
- Full Macintosh OS X Preferences support, including saving preferences for each user.

- Full use of Macintosh Menus in Windowed mode.
- Creating of Atari ATR disk images.
- Media Status Window
- Emulation of Atari 825, Atari 1020, and Epson FX-80 Printers
- ATR Disk Editor
- Disk Image Conversion
- Atari Function Key Window
- Enhanced debug Monitor
- Ability to run emulator at full speed (not limited to 50/60 frames per second).
- Emulation of the full Atari 5200 controller, including both buttons and keypad.
- Ability to use Mac joysticks as paddles, and true 5200 analog controllers.

3. Keyboard

The image below shows the actual keyboard of an Atari XE model:

Differences among other models:
800 XL has same keys, but Help, Start, Select, Option and Reset are placed vertically on the right side of other keys,

- 1200 XL additionally has F1, F2, F3 and F4 function keys,
- 800 has no F1-F4 nor Help key, the Inverse key (the one in the bottom-right corner) is marked with the Atari logo, but has the same functionality,
- 5200 has no keyboard, however each joystick has its own keypad (see below).

The general philosophy in keyboard layout is to assign the functionality (not the location) of the Atari key to the equivalent Macintosh keyboard key.

First, here are the definitions for the 5200 keypads:

Macintosh Key	5200 Keypad Key
F4	Start
P	Pause
R	Reset
0-9 (either keypad or regular)	0-9
* (either keypad or regular)	*
- (either keypad or regular)	#
Shift	2nd Button
Joystick Fire	1st Button

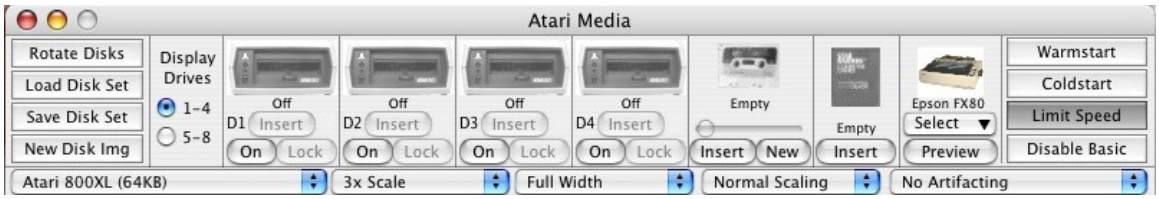
Note: The same keys are used for all 5200 controllers, that is, pressing a key presses it on all controllers simultaneously.

Then the definitions for the Atari computer models:

Macintosh Keystroke	Atari Keystroke	Description
Esc	Esc	
F2	Option	
F3	Select	
F4	Start	
F5	Reset	
Pause Break	Break	
F15 (non- Apple)	Break	
	Break	
Backquote `	0- 9	
0- 9	Shift+8	types ‘@’
Shift+2	Shift+’*’	types ‘^’
Shift+6	Shift+6	types ‘&’
Shift+7	*	types ‘*’
Shift+8	-	
-	Shift+’- ’	types ‘_’
Shift+’- ‘	=	
=	+	types ‘+’
Shift+’=’	Backspace	
Backspace	Tab	
Tab	A- Z	
A- Z	Shift+’,’	types ‘[‘
[	Shift+’.’	types ‘]’
]	Caps	
Caps Lock	Shift+Caps	
Shift+Caps	;	
Lock	Shift+’;’	types ‘:’
;	Shift+7	types '
Shift+’;’	Shift+2	types ”
'	Return	
Shift+’”’	<	types ‘<’
Enter	>	types ‘>’
Shift+’<’	Shift+’+’	types ‘\’
Shift+’>’	Shift+’=’	types ‘|’
\	Control+’>’	inserts space
Shift+’\’	Shift+’>’	inserts line
Insert	Shift+’<’	clears screen
Shift+Insert	Shift+Caps	
Home	Control+Backspace	deletes char
Page Up		deletes line
Delete	Shift+Backspace	
Shift+Delete	Inverse (XL/XE)/	
End	Atari key (800)	
	Help (XL/XE)	cursor left
Page Down	Control+’+’	cursor right
Left Arrow	Control+’*’	cursor up
Right Arrow	Control+’- ’	cursor down
Up Arrow	Control+’=’	
Down Arrow		

The Atari function keys Start, Select, Option, and Break may also be pressed through the Function Key window. See the Control Menu (section 6.4) for information on how to open this window.

4. Media Status



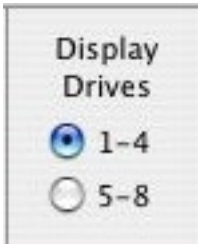
The Media Status Window on the Atari800MacX emulator allows you to control all of the aspects of digital media emulation from one graphical interface. Besides media management, it allow you to control some often used aspects of the emulator as well. If it is not displayed at the moment, you can display if by issuing the "Show Media Status Window" command in the Media menu. The media status window looks like this:

The status window contains the following elements:

Disk Image pushbuttons:

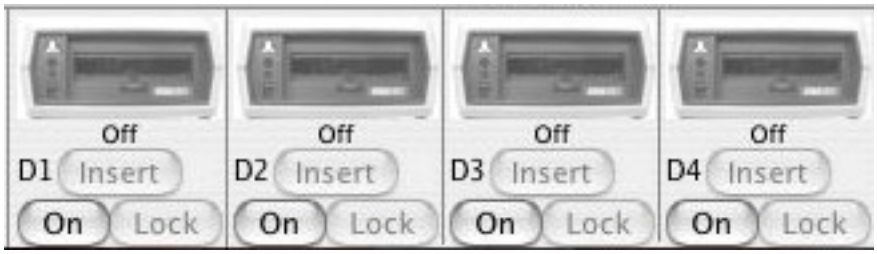
This section of the window provides pushbuttons allowing you to access some of the common disk functions that are normally available in the Media menu or the Disk Drive Management window. See the Media Menu (section 6.1) for full explanations of the commands.

Displayed Drives selector:



This section of the window controls which disk drives are shown in the Disk Drive Status display to the right of it. You may choose to display either D1 through D4, or D5 through D8.

Disk Drive Status Display/Buttons:



This section of the window allows you to control one of the emulated disk drives on the Atari. The drive may be turned on/off with the on/off button. If the drive is on, you may insert a disk image by pressing the Insert button. You also can drag and drop a disk image file from the finder to the drive picture to insert the disk. When an image is inserted, you can write protect/unprotect with the Lock/Unlock button. When the drive is write protected, a small lock icon will appear above the lock button. Finally, you can drag disks from one drive to another as well.

Status may also be displayed by the drives. The on/off, insert/eject, and lock/unlock buttons will light up/darken when disks are inserted/removed, etc. Also, there are two LED's on the drive. One indicates power, and the second indicates read/write activity, red for write, and green for read. In addition, the sector the drive is reading or writing may be shown on the disk drive door. The activity LED's and sector status displays may be turned on/off on the Display Tab (section 5.1) of the Preferences window.

Cassette Drive Display/Buttons:

This section of the window allows you to control the emulated cassette drive on the Atari. You may insert or remove a cassette image with the Insert/Eject button. When a cassette is inserted, the slider may be used to change the tape position, and the counter will indicate where the tape is, in block count. You can also drag a cassette image file from the finder and drop it on the cassette picture. The New button will allow you to create a blank cassette file (.cas). It will ask you for the name of the new image, then create the file, and insert it into the cassette drive. The emulator supports reading and writing from/to cassette images. Once the cassette is started by holding start during reboot, or by using the CLOAD/CSAVE basic call, you must press the space bar to continue loading/saving the file.

Cartridge Display/Button:

This section of the window allows you to control the emulated cartridge slot on the Atari. You may insert or remove the cartridge image using the Insert/Eject button. You can also drag a cartridge image file from the finder and drop it on the cartridge picture.

Printer Control Menu/Button:

This section of the window allows you to chose which printer emulation you are using from the "Select" pulldown. You may choose the Text Printer, Atari 825, Atari 1020, or Epson FX-80. The picture of the selected printer will be displayed in this section. The menu also has an option to reset the printer, which is equivalent to turning the printer off and on. The Preview button is used to view what the current printer output looks like. It is active for every printer emulation except the Text Printer. For more info on Printer Emulation, see the Printer Emulation (section 7.0). For setting the printer options, see the Printer Tab (section 5.3) in Preferences.

Emulator Control pushbuttons:

This section of the window provides pushbuttons allowing you to access some of the common emulator control functions that are normally available in the Control Menu. See the Control Menu (section 6.4) for full explanations of the commands.

Emulator Control pulldowns:

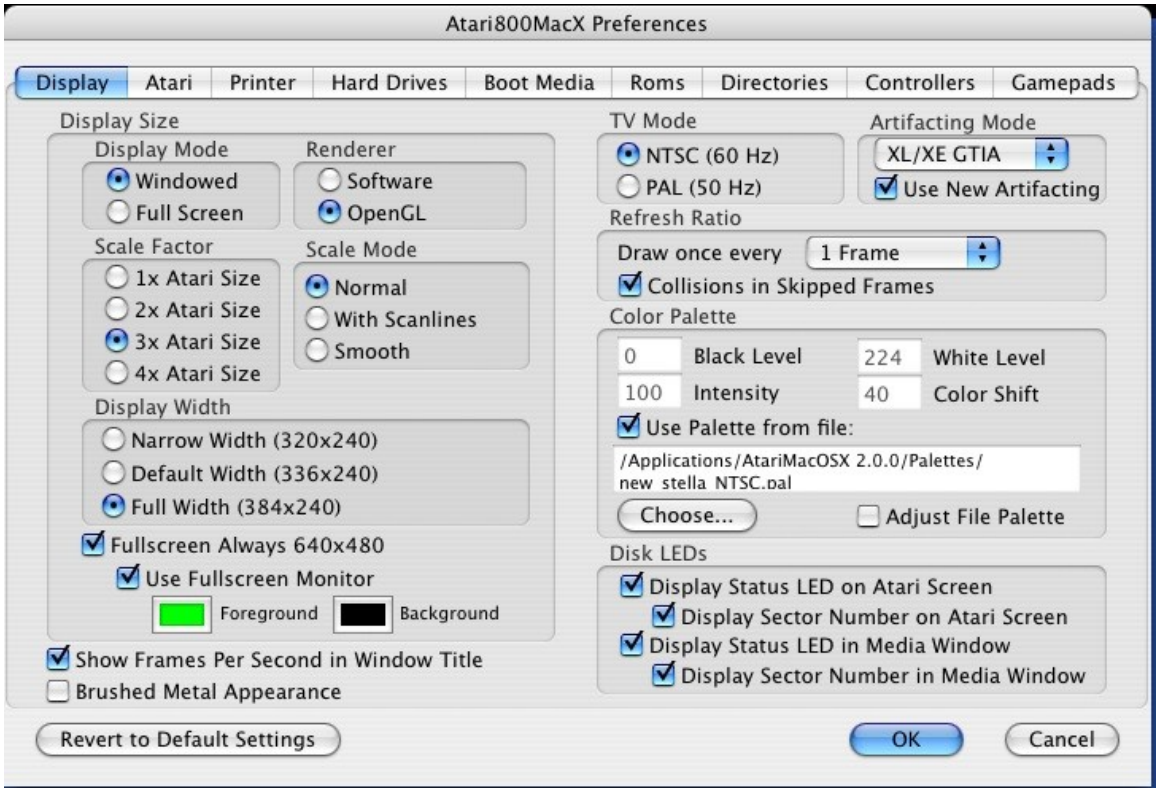
This section of the window provides five pulldowns which allow the user to choose the type of machine that is emulated, along with aspects of how it is displayed. You can choose the amount of window scaling, the width of the window, type of window scaling, and TV artifacting type.

5. Preferences

The Atari800MacX Preferences Windows is accessed through the Preferences menu item in the application menu. It allows the user to select options that Atari800MacX starts up with. It contains seven tabs, which control different aspects of the emulation. The options on the last six tabs are controllable only through this interface. Most of the options in the first tab are also controllable through the Display menu .(section 6.2)

Detailed descriptions of the options are the seven tabs are available through the following sections.

5.1 Display Tab



The Display Tab is the heart of the graphics control of the emulator.

From here you can change the:
Display Size

Display Mode:

These radio buttons allow you to choose to display the emulator in a standard Aqua window, or to use the entire screen for displaying the emulator. When in full screen mode, normally you will want to check the Fullscreen Always 640x480 item. This will lock the display to a fixed size. If this item is unchecked, then the Scale Factor and Display Width parameters below still apply. The emulator will attempt to find a suitable mode. Note, not all modes will work with all display adapters. If the

emulator suddenly quits when changing to full screen, the Scale Factor and Scale Mode were not compatible with your graphics card and fullscreen. You can also change the Display Mode setting from the Display Menu. (section 6.2)

Renderer:

These radio buttons allow you to which renderer Atari800MacX uses to display the screen. OpenGL requires a video card that supports OpenGL, but will be much faster at scaling the screen to larger sizes than the Software mode. However, OpenGL is slower at the Smooth scaling than the Software renderer. OpenGL is also more efficient in OSX 10.4 and high, where Apple has implemented something called "coalesced updates". If you are having speed or graphics problems on your particular machine, you may want to try the other renderer from what you are currently using. The default value in Atari800MacX 3.0 and higher is OpenGL.

Scale Factor:

These radio buttons allow you to choose between the standard Atari Screen Size where one Atari pixel is mapped to one Macintosh pixel, 2xAtari Screen size (one Atari pixel is mapped to four, 2x2,Macintosh pixels), 3x Atari Screen size (one Atari pixel is mapped to nine, 3x3,Macintosh pixels), or 4x Atari Screen size (one Atari pixel is mapped to sixteen, 4x4,Macintosh pixels). You can also change this setting from the Display Menu. (section 6.2) Note, on slower Macs, you may want to change your video depth to Thousands of Colors to achieve full frame rate when using more than 1x mode. (Don't change this while running the emulator!!!).

Display Width:

These radio buttons allow you to choose between narrow, default, and full widths of the Atari screen. These correspond to 320x240, 336x240, and 384x240 respectively when in 1x Scale Factor mode. You can also change this setting from the Display Menu. (section 6.2)

Fullscreen Monitor:

This check box allows you to select the Debug Monitor to run in Fullscreen. Without this item checked, if the Debug Monitor runs (by pressing F8), or the Emulated machine crashes, and the unrecoverable error dialog runs, the emulator will leave Fullscreen and display the monitor or crash dialog in a window. With this item checked, the monitor will appear in fullscreen. You can also select the foreground and background colors for the monitor text. Note, you can currently only use the Fullscreen if you also select the Fullscreen Always 640x480 Item.

Show Frames Per Second In Window Title

This checkbox lets you choose to display the Frames Per Second (FPS) that the emulator is running at the moment. This can be used to check that your Macintosh is fast enough to run the Atari at full speed. It should

indicate 50fps for PAL, and 60fps for NTSC. FPS Display is not available in Fullscreen mode. However, since Fullscreen mode always runs in 256 colors, speed is usually not an issue. You can also change this setting from the Display Menu. (section 6.2)

Brushed Metal Appearance

This checkbox lets you choose it the windows in the emulator use the Standard Aqua appearance, or if they use the Brushed Metal appearance, ala Safari or iTunes. The emulator must be restarted after a change in this setting for it to take full effect. Note, you must be using OSX 10.3 or higher to used the Brushed Metal Appearance.

TV Mode

These radio buttons allow you to choose to the refresh rate of the emulator, either NTSC (60 frames per second) or PAL (50 frames per second).

Refresh Ratio

This pull down allows you to choose how often to redraw the simulated Atari screen. You can choose to do it every Atari frame, or every 2nd, 3rd, or 4th one. On very slow Macs, this could be used to bring the frame rate up to full speed (50 or 60 frames per second). The checkbox then lets you determine if player/missile collisions are detected in the frames that are skipped. By default, they are.

Artifacting Mode

This pull down allows you to choose how the emulator simulates Artifacting, which occurred when the original Atari used a TV for displaying its video. Some games depended on the colors these Artifacting effects produced.

Use New Artifacting

This checkbox allows you to choose if the new Artifacting method released in Atari800MacX 3.3 should be used. It produces much clearer text, and correctly varies luminance and displays player missile graphics in artifacted mode.

Color Palette

These options allow the user to customize the colors used by the Macintosh to Emulate the Atari's color palette. 8-bit Atari machines have 256 colors, and the emulator can either generate a palette, or use a pre-generated palette stored in a file. By default, it uses the real.act file stored in the Palettes folder in the application directory.

If the "Use Palette from File" checkbox is checked, then you can choose the palette file with the Choose.. button. If you wish, you may then also check the "Adjust File Palette" checkbox to adjust the Black Level, White Level, and Intensity parameters described below. These adjustments do not affect the file itself.

If the "Use Palette from File" checkbox is not checked, then the emulator will generate a palette using the values you enter for the following 4 parameters:

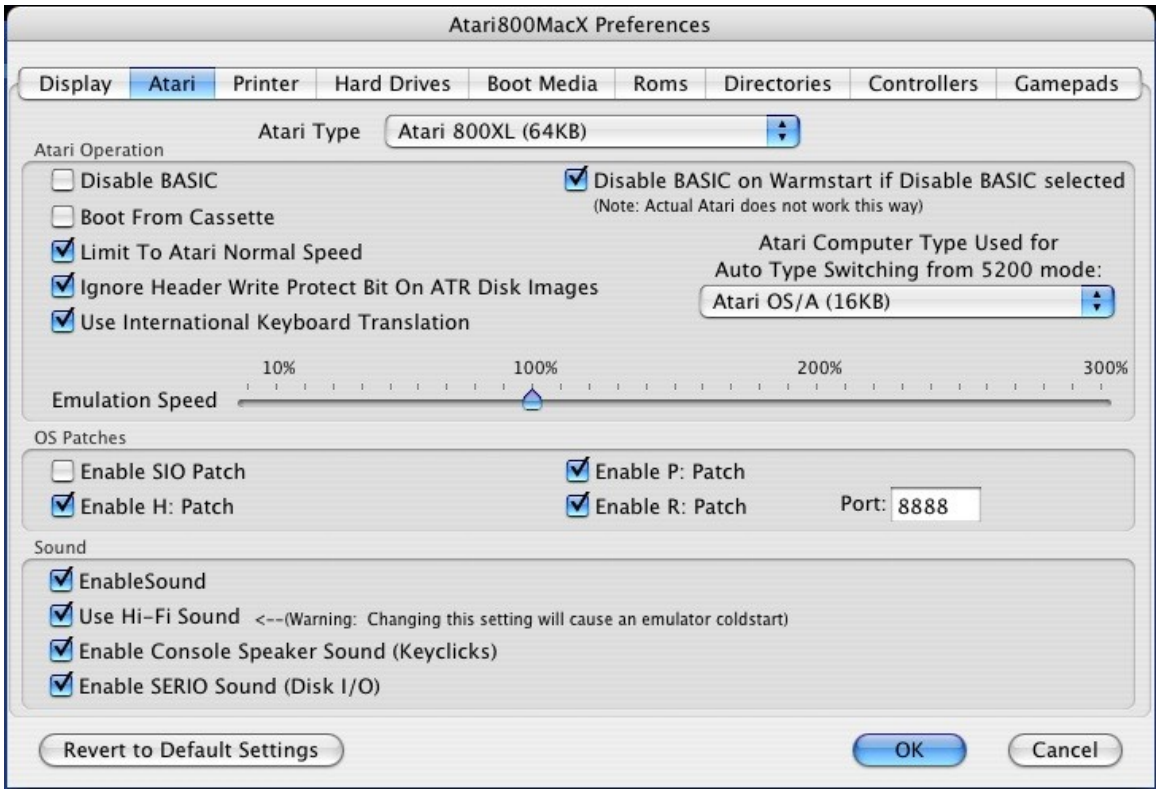
- **Black level** adjusts brightness of Atari colors 0, 16, 32, etc. (darkest ones),
- **White level** adjusts brightness of Atari colors 15, 31, 47, etc. (lightest ones),
- **Intensity** adjusts saturation of all colors,
- **Color shift** adjusts hues to be used for Atari colors 16-255 (0-15 are always gray). A hue is used for colors 16-31, next one for colors 32-47, etc.

Each parameter must be an integer within range 0-255.

Disk Leds

These options allow the user to chose if disk activity indicators are shown in the Atari Emulator window (lower right corner) and in the Media Status Window (Driver Status LED's and sector numbers on drive doors).

5.2 Atari System Tab



The Atari System Tab controls the type of Atari System that the emulator is emulating, as well as allows some aspects of the Atari OS and emulation to be controlled.

Atari Type

This pulldown allows the user to chose the type of Atari machine emulated, and it's RAM size.

Disable Basic

This checkbox determines if the Atari Basic cartridge is disabled when the emulator boots or causes a Cold Reset.

Disable Basic on Warmstart if Disable Basic Selected

This checkbox determines if the Atari Basic cartridge is disabled when the user causes a Warm Reset. Note, the simple Disable Basic checkbox must also be selected for this to work. Also, note this is not how the Actual Atari HW functions, but is provided as a user convienence.

Boot From Cassette

This checkbox determines if the emulated Atari will boot from the emulated cassette when it is rebooted. After the boot, you must press the space key to start the cassette (like pressing Play on the actual recorder).

Limit To Normal Atari Speed

This checkbox determines if the speed (in frames per second) of the emulator is limited to 50 or 60 (PAL or NTSC), of if it can free run, allowing it to run as fast as your Macintosh able. This feature can also be controlled from the Control Menu. (section 6.4)

Ignore Header Write Protect Bit On ATR Disk Images

This checkbox should be checked to ignore the Header Write Protect Bit that is set in some ATR disk images. It is unchecked by default, and should only be checked if the user needs to be able to write to an ATR image that has the bit set. When this box is checked, the user will be able to set the drive to either read-only or read/write in the Drive Management (section 6.1) panel.

Use International Keyboard Translation

This checkbox should be checked to use keymapping specified for an International keyboard in the International Input Menu in System Preferences. Use this is you are using an non-US English keyboard and want key presses properly translated to Atari keys.

Atari Computer Type Used For Auto Type Switching from 5200 mode

When the emulator is operating in 5200 mode, and the user inserts computer media (cartridge, disk, executable file), the emulator will automatically switch to Computer mode. It defaults to an 800XL with 64K, however, this pulldown allows you to choose which computer type will be switched to automatically.

Emulation Speed

If the limit to normal Atari Speed is checked above, then this control will determine the speed at which the emulator runs relative to a real Atari. It can be adjusted from 10% to 300%, with the default being 100%, or the same speed as a real Atari.

Enable SIO Patch

The SIO (Serial Input/Output) patch is meant for speeding up disk operations. Originally, data between Atari computer and a disk drive is sent using slow, serial transmission (19200 bits per second). The Atari800 core emulator fully emulates the disk drive, so unlike other emulators it does not require the patch. However, it is much faster, if the emulator can immediately transfer data between a disk image and the Atari's memory, skipping serial transmission emulation. The patch is only a change in the Atari OS, it does not disable real drive emulation.

Enable H: Patch

This checkbox determines if the Hard Disk Drive Device patch is applied to the OS. The H: ('Hard Disk') device gives access to every file on your Macintosh to every Atari program. The device number specifies the base directory to be used and if the text conversion is applied:

- H0: – program directory, no conversion
- H1: - H4: – directories #1- #4, no conversion
- H5: – program directory, text conversion applied
- H6: - H9: – directories #1- #4, text conversion applied

Currently only 'read file' and 'write file' operations are supported by the H: device (delete file, rename file etc. won't work).

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Enable P: Patch

This checkbox determines if the Printer Patch (P:) is applied to the emulator. When the patch is enabled, the user may then select one of the printer emulations from the Printer Preferences Tab, or from the Media Status Window.

Enable R: Patch

This checkbox determines if the Serial Port Patch (R:) is applied to the emulator. When the patch is enabled, the user may then specify the TCP port number to use to "dial- in" to BBS software using telnet in place of the original modem connection. Currently only dial- in capability is present. "Dial- Out" will be added in a future release.

Enable Sound

This checkbox determines if the playback of Atari Sound is emulated. This feature can also be controlled from the Sound Menu.

Use Hi- Fi Sound

This checkbox determines if the new Hi- Fi version of Sound Emulation is used. The Hi- Fi sound will require more processing power, so you may not want to use it on slower machines. Changing this option requires the emulator to perform a coldboot, so you will loose what you are currently running on the Atari. Also, some demo's may produce better sound in the old sound emulation, so you should try both types and use the one you prefer.

Enable Console Speaker Sound (Keyclicks)

This checkbox determines if the console speaker is emulated. This is produces the keyclicks when typing on the Atari keyboard.

Enable SERIO Sound (Disk I/O)

This checkbox determines if the Serial IO sound is emulated. This is what produces the sound when Disk or Cassette Input/Output occurs.

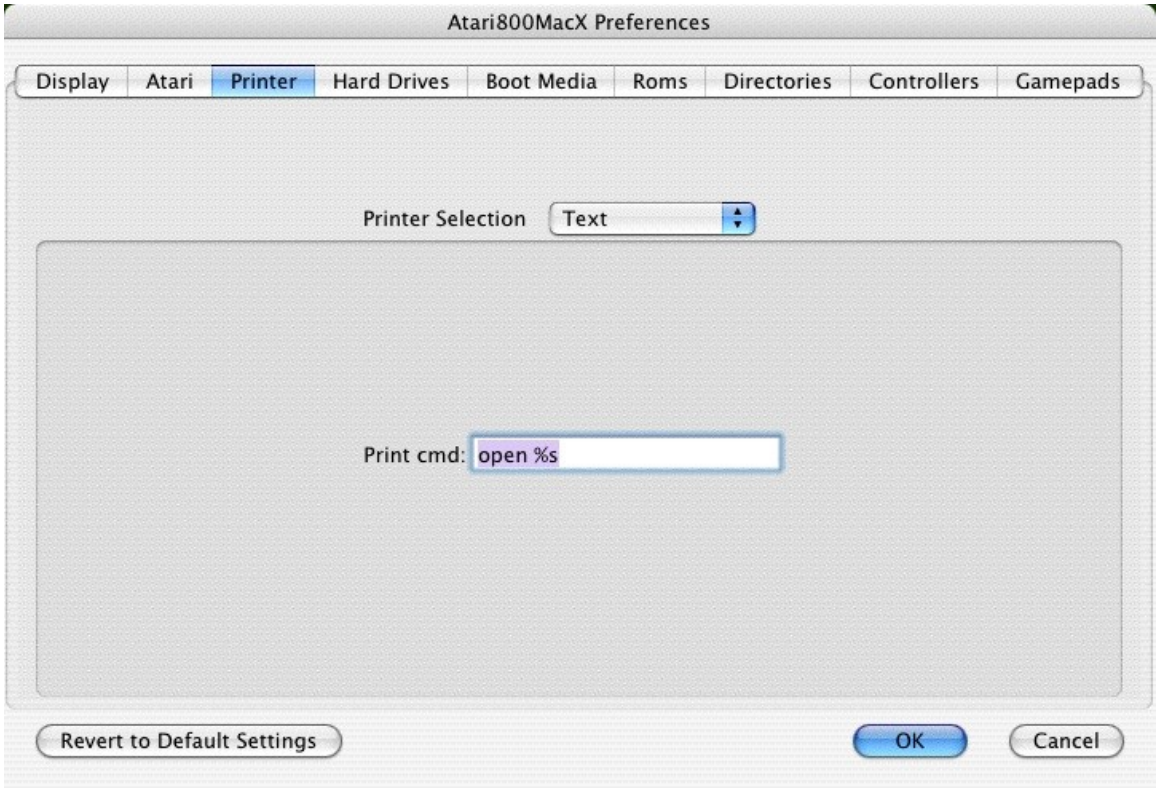
5.3 Printer Tab

The Printer Tab controls the type of printer emulation that is used for outputting to the P: device from the emulated Atari. Note, that the P: Patch must be enabled on the Atari System Tab for this tab to be active.

The are four choices for printer emulation, Text Printer, Atari 825, Atari 1020, and Epson FX-80. The Text printer simply sends the printer output to a text file with optional script processing, while the other three choices emulator a legacy printer, and allow the user to save the printer output in a PDF file. More info on use of the printer can be found in the Printer Emulation section, 7.0.

The sections below describe the options available for each of the printer types.

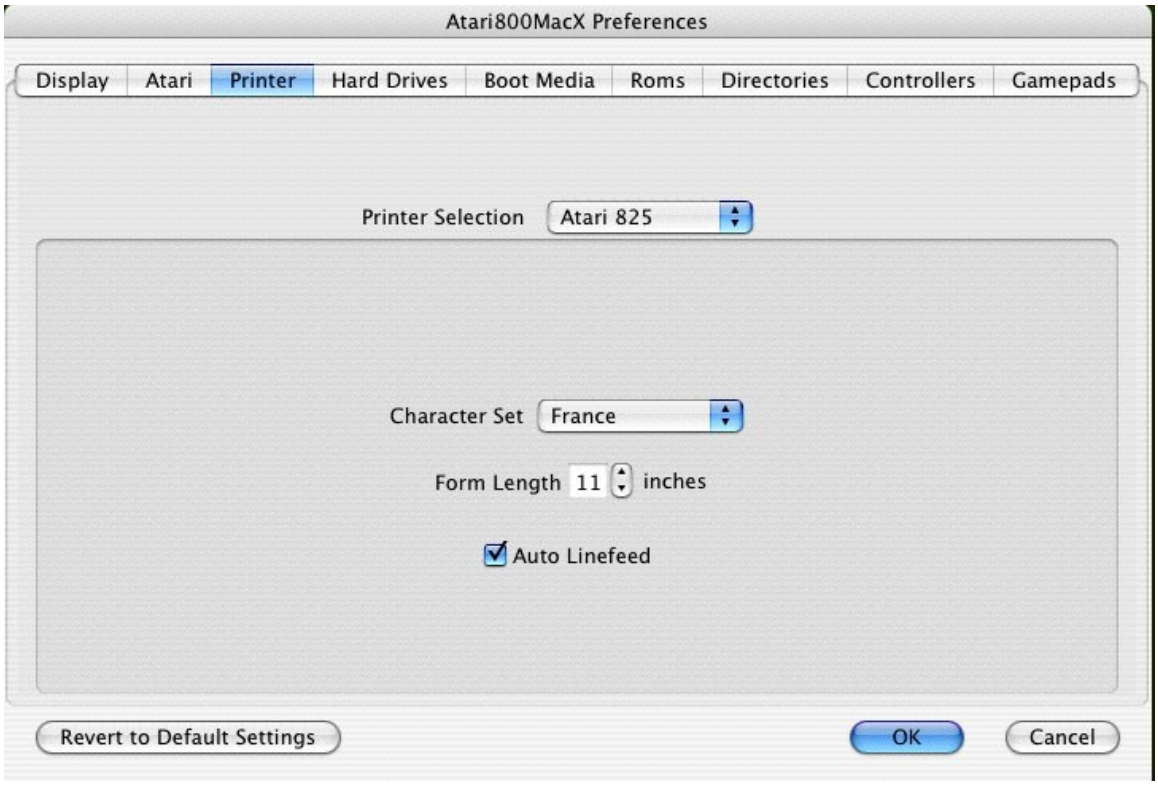
Text Printer



Print Command:

The only option for this printer type is the command used to print. Within the command, %s is used to represent the file name of the temporary file generated during printing. For example, if you wanted the printed text to be opened in BBEdit, you would enter "bbedit %s" (without quotes) in the box. By default, the OSX command "open %s" is used, which will open the printed text in TextEdit by default, unless you have changed your file associations. The temporary files used for printing are created in the printer output directory, which you can choose on the Default Directories Tab.(section 5.7) Also, if you have UNIX printing set up, you could directly print using "lpr %s"

Atari 825 Printer

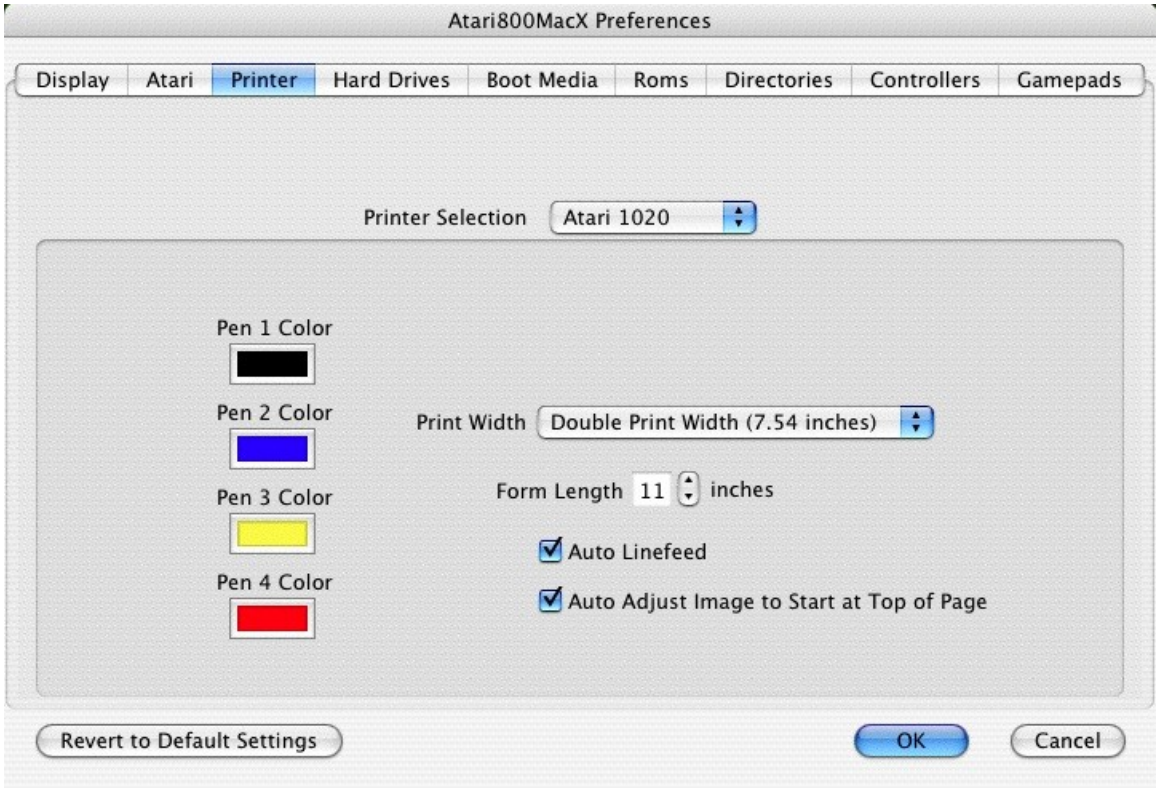


Character Set:
This option allows you to choose which international character set will be used with the printer. On the real Atari 825, this was set by a DIP switch.

Form Length:
This option sets the form length, in inches, for pages output by the Printer Emulation. The real Atari 825 does not have a concept of form feeds or page length, but this setting is used to determine the length of a page in the PDF output file from the Printer Emulation. For more details, see the Printer Emulation section, 7.

Auto Linefeed:
This option, which is set by default, will automatically add a linefeed character to every carriage return sent from the emulated Atari to the emulated Printer. This function was normally preformed by the printer hardware interface or driver on the Atari (Atari 850 or other). If you get blank lines in your output, you may need to turn this option off.

Atari 1020 Printer



Pen 1- 4 Color:
This option allows you to choose the color of each pen in the Atari 1020 printer. Clicking on the color box will bring up a standard Mac color selection dialog.

Print Width:
This original Atari1020 used 4" wide paper, and had a print width of 3.77 inches. You can use this original print width centered in normal width modern paper, or you can specify double print width, in which case all of the printer output will be scaled up by a factor of 2 (both height and width), and the printer output will fill most of the width of modern paper.

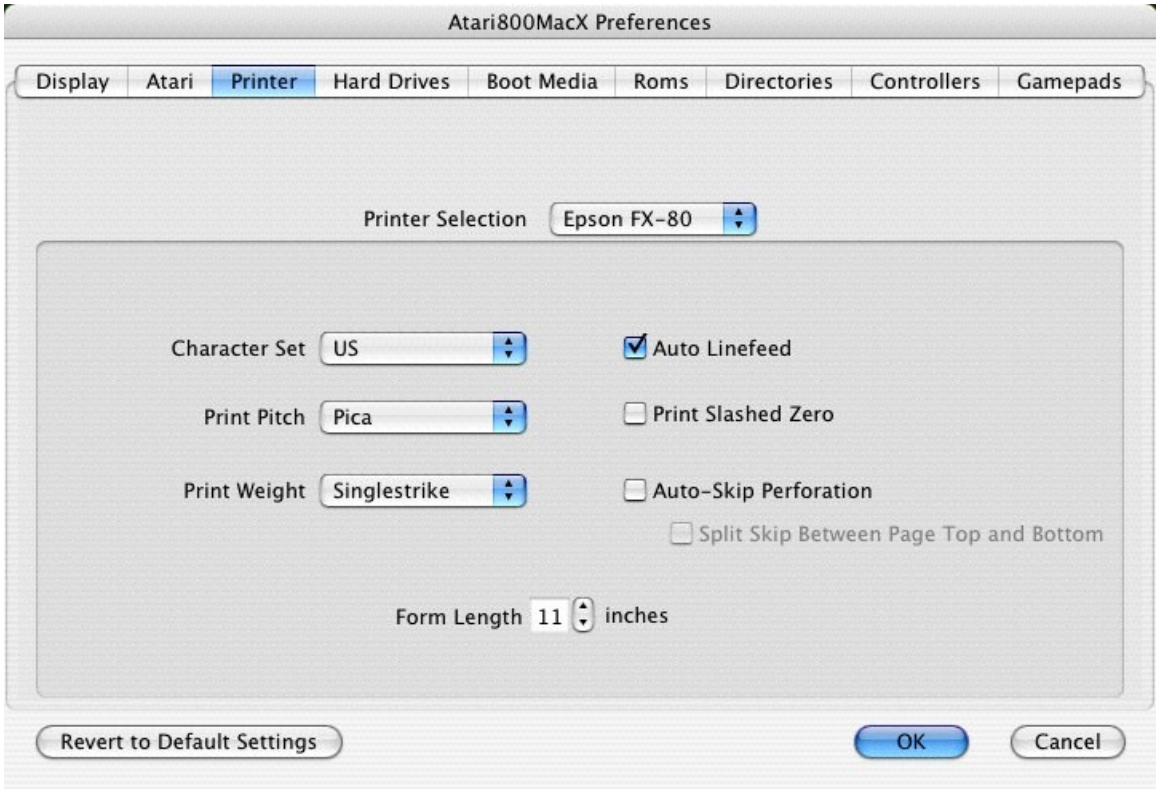
Form Length:
This option sets the form length, in inches, for pages output by the Printer Emulation. The real Atari 825 does not have a concept of form feeds or page length, but this setting is used to determine the length of a page in the PDF output file from the Printer Emulation. For more details, see the Printer Emulation section, 7.

Auto Linefeed:
This option, which is set by default, will automatically add a linefeed

character to every carriage return sent from the emulated Atari to the emulated Printer. This function was normally performed by the printer hardware interface or driver on the Atari (Atari 850 or other). If you get blank lines in your output, you may need to turn this option off.

Auto Adjust Image to Start of Page:
This option automatically readjusts the paper, so that the output of the printer starts at the top of the page. This is useful for the 1020, as the printer may print above the start paper location, and would then print off the top of the page.

Epson FX-80 Printer



Character Set:
This option allows you to choose which international character set will be used by default with the printer. On the real Epson, this was set by a DIP switch.

Print Pitch:
This option allows you to choose which character pitch will be used by default with the printer. On the real Epson, this was set by a DIP switch.

Print Weight:
This option allows you to choose which character weight will be used by default with the printer. On the real Epson, this was set by a DIP switch.

Form Length:
This option sets the form length, in inches, for pages output by the Printer

Emulation. On the Epson emulation, this sets both the internal page length in the emulated printer, as well as determining the length of a page in the PDF output file from the Printer Emulation. For more details, see the Printer Emulation section, 7.

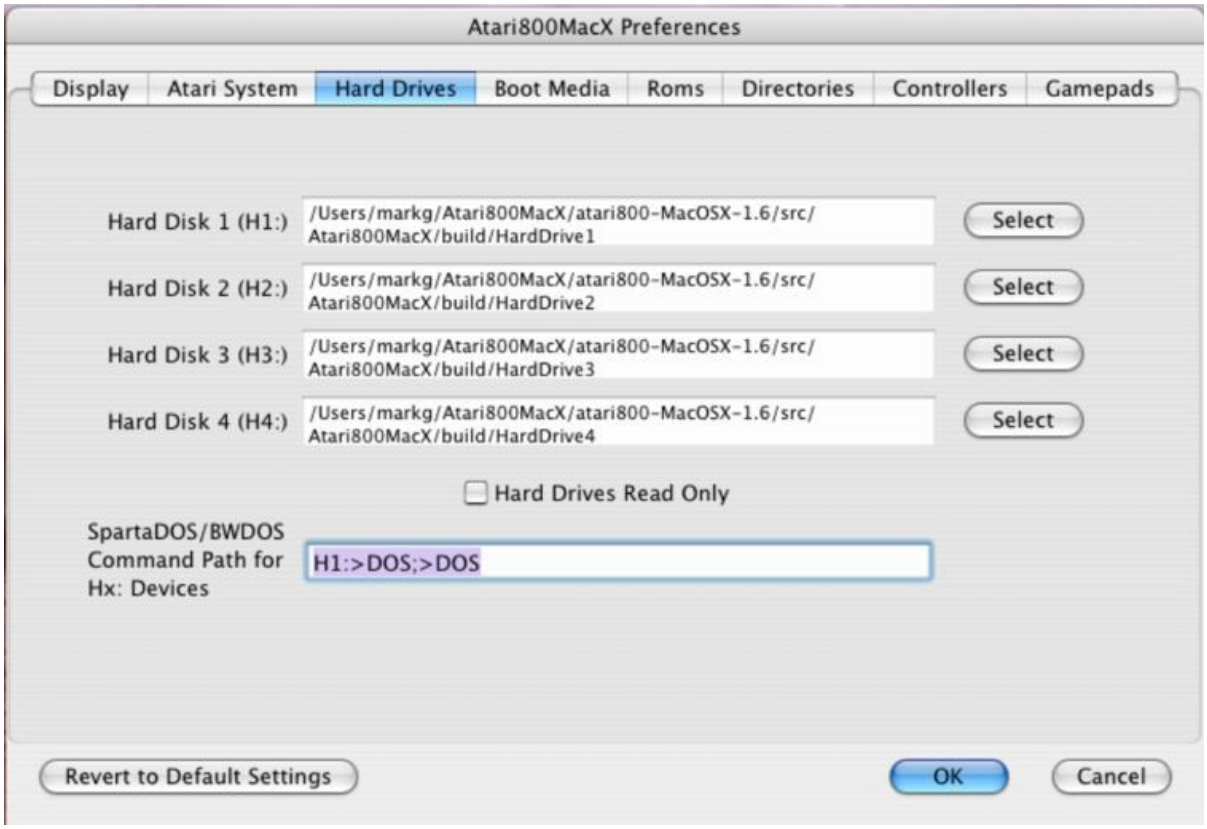
Auto Linefeed:
This option, which is set by default, will automatically add a linefeed character to every carriage return sent from the emulated Atari to the emulated Printer. This function was normally performed by the printer hardware interface or driver on the Atari (Atari 850 or other). If you get blank lines in your output, you may need to turn this option off.

Print Slashed Zero:
This option allows you to choose if zero characters are printed with a slash by default with the printer. On the real Epson, this was set by a DIP switch.

Auto Skip Perforation:
This option, sets the printer to automatically skip 6 lines at the end of the page. This is very useful for program listings and other non-page formated output. On the real Epson, this was set by a DIP switch. Also, if you choose this option, you may additionally choose to split the 6 lines between the top and bottom of the page, giving a 3 line margin at the top, and a 3 line margin at the bottom of the page. This additional option was not available on the original printer.

5.4 Hard Drives Tab

This tab allows you to set the directories used by the emulator for the Hard Disk Device Emulator, H:



There are four directories, and they are mapped to devices as follows:

- H0: – program directory, no conversion
- H1: - H4: – directories #1- #4, no conversion
- H5: – program directory, text conversion applied
- H6: - H9: – directories #1- #4, text conversion applied

You use the checkbox at the bottom of the tab to make the H: devices read only, as opposed to read/write.

Starting in version 1.1, Atari800MacX supports all normal DOS functions for the hard drives, including Rename, Delete, Note, Point, and Open for modify (read/write). One caveat is that all file names created from the Mac side should be lower case.

Starting in version 1.2, Atari800MacX supports subdirectories on the hard drives.

Note, the Delete function will not work on Hard Drives from the Atari DOS 2.x or MYDOS menus, as they do not recognize Hx: as a drive. However, the XIO functions will work to delete.

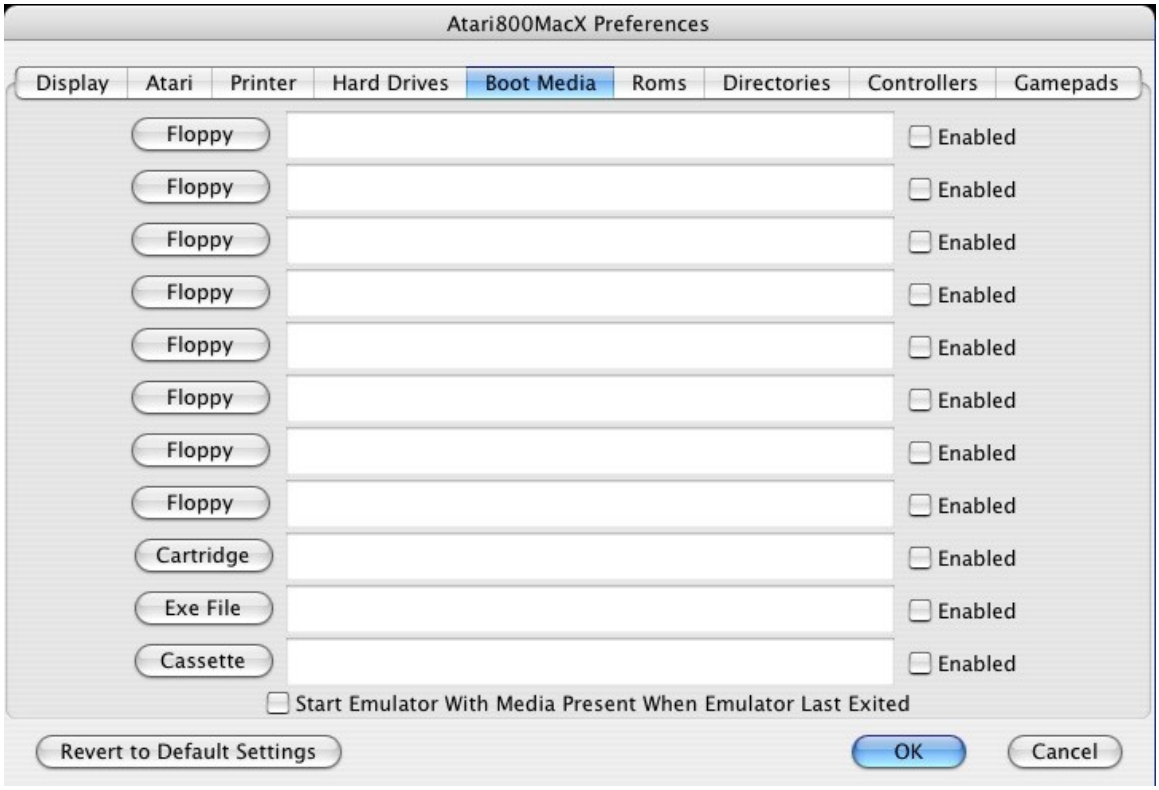
All file and Directory functions are supported by SpartaDos or BWDos from the command line, as well as from their XIO equivalents. Binary Load (with all options) will also work with MYDOS and its XIO equivelents.

Also, there is a capability to specify a Command Path for use with SpartaDos and BW-DOS when issuing command from the Hx: prompt. The normal path used with Dx: drives will not work, as this is part of the driver for the Dx: devices in the DOS. The paths specified here are separated by semicolons, and may include the normal directory seperator character ('>''). The path defaults to "H1:>DOS;>DOS". This means that the "DOS" directory on Hard Drive 1 will be searched for the command, then the "DOS" directory on the current drive, then finally the current directory will be searched.

5.5 Boot Media Tab

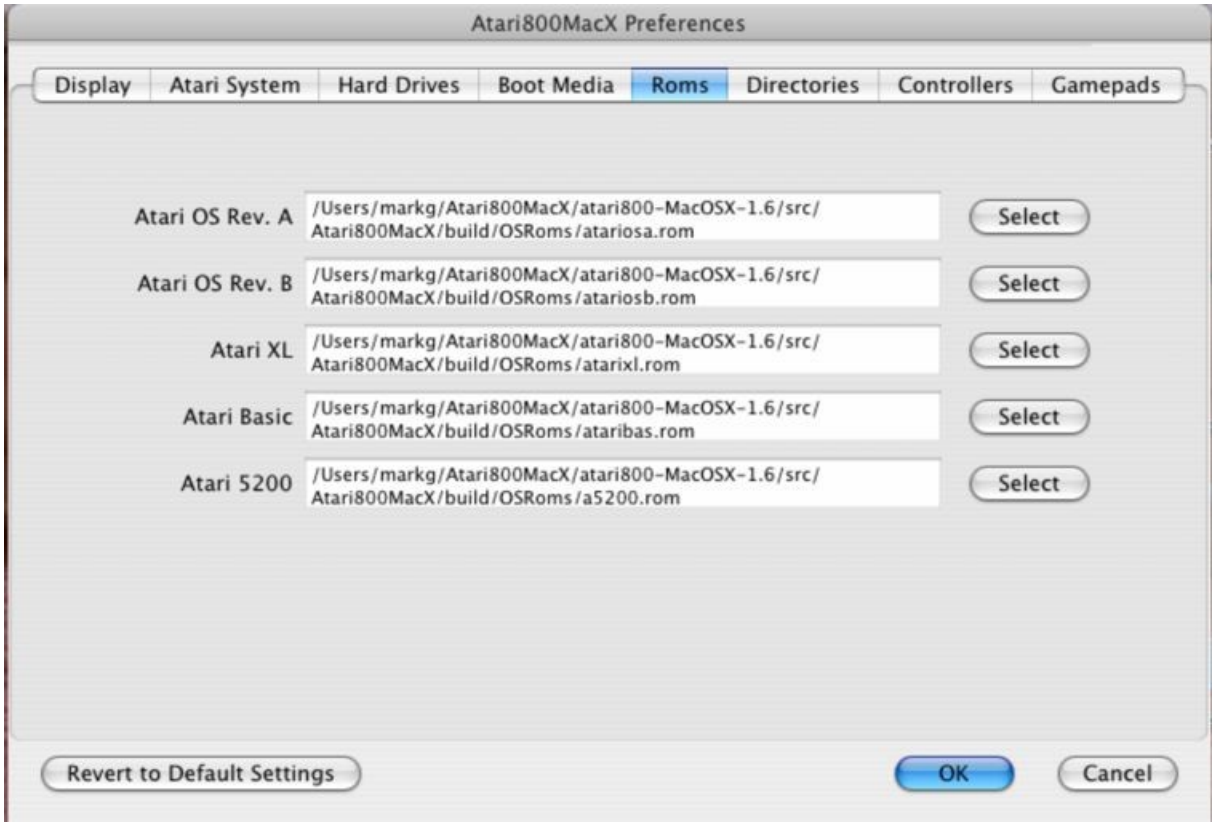
This tab is used to set the contents of the Emulator's peripherals when it boots. Starting with version 3.4 of the emulator, there are two options here. One is to start with the media that was present when the emulator was exited the last time. This option is chosen by checking the "Star Emulator With Media Present When Emulator Last Exited" checkbox. When this is checked, the other controls on this tab are not enabled.

The other option is chosen by leaving the box unchecked. Then, you can specify up to eight floppy disks, one cartridge, one cassette, and one directly executable file (in Atari binary format), which will run when the emulator boots. This feature lets you specify the favorite game cartridge, or programming disk, and have it always be present in the emulator at startup. To choose a disk, cartridge, etc, simply press the button for the device, and browse to the file. It's name will appear in the middle text field. In addition, you may enable or disable that particular piece of media with the Enabled checkbox to the right of each field.



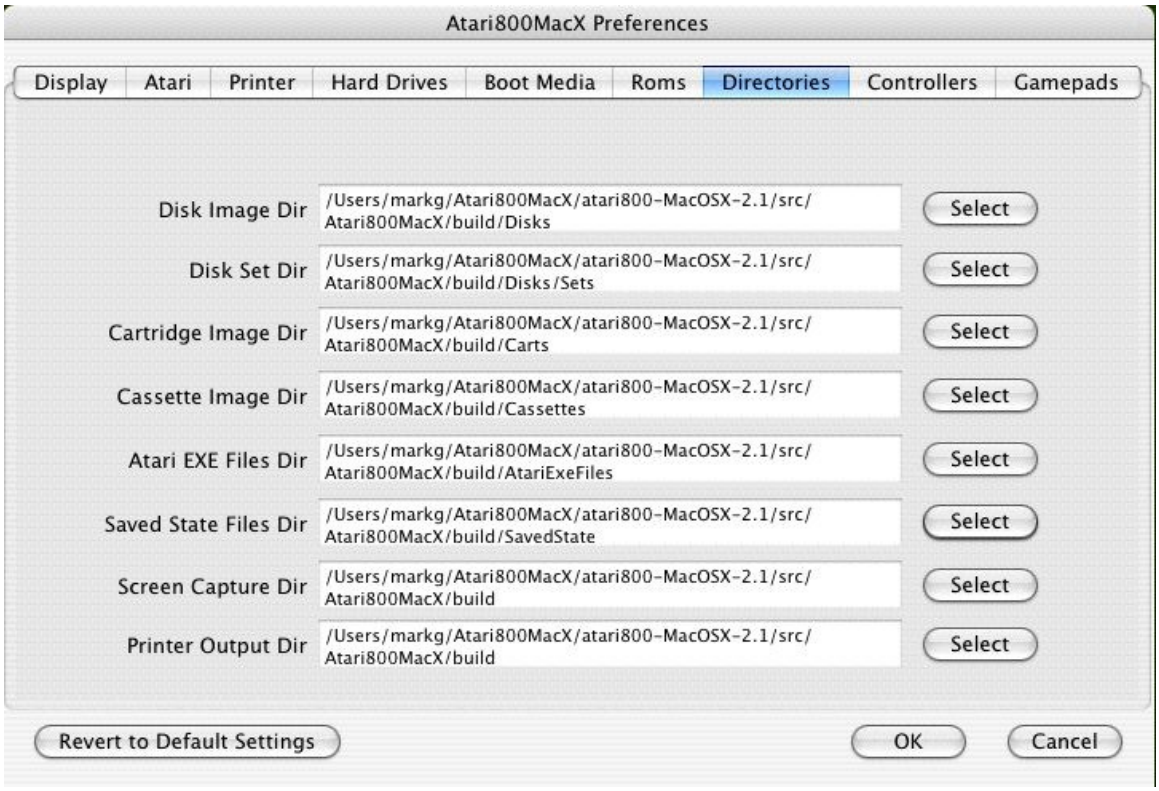
5.6 OS ROMS Tab

This tab allows you to chose the ROM files used in the emulation of the Atari. These files are not provided with the emulator. To select the file, press the select button, and the chosen filename will appear in the text field. By default, files in the OSRoms folder in the Atari800MacX folder are chosen, with standard names of atariosa.rom, atariosb.rom, atarixl.rom, ataribas.rom, and a5200.rom.



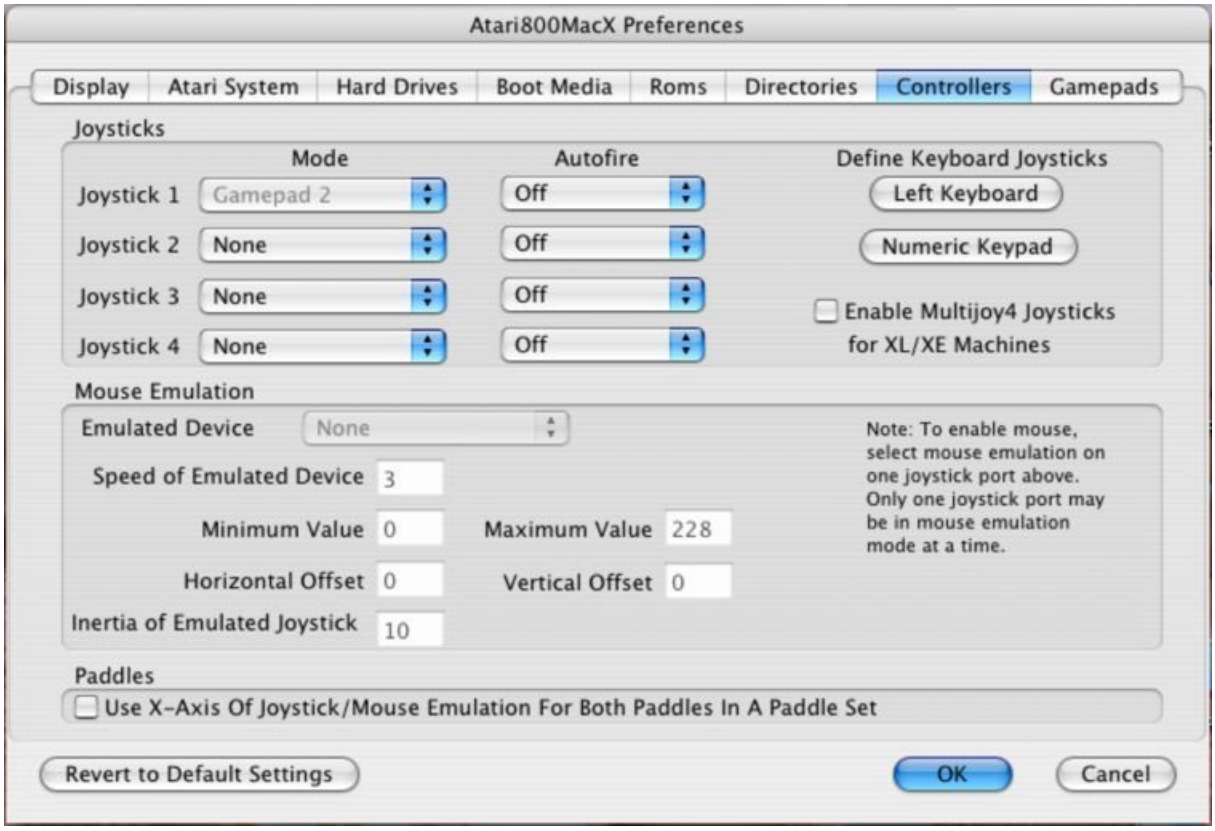
5.7 Default Directories Tab

This tab allows the user to specify the default directories used for loading/saving various types of file used by the emulator. To choose the directory, press the select button next to the field, and when the directory is chosen, it's name will appear in the text field.



5.8 Controllers Tab

The Controllers Tab allows the selection of Joystick types for the up to 4 joysticks that may be used with the Atari. The Atari 400/800/5200 models support the use of 4 joysticks, while the XL/XE models allowed 2. (4 are allowed on the XL/XE with the Multijoy4 modification).



Joysticks

For each joystick port, you can choose between 6 types of joystick emulation:

- None - There is no joystick on this port.
- Numeric Keypad - Use the numeric keypad keys as a joystick. The key layout for this joystick is programmable by pressing the "Left Keyboard" button.
- Left Keyboard - Use keys on the left side of the keyboard as a joystick. The key layout for this joystick is programmable by pressing the "Numeric Keypad" button.
- HID Controller 1 - Use the first attached Macintosh OS X HID Joystick or Gamepad as a joystick.
- HID Controller 2 - Use the second attached Macintosh OS X HID Joystick or Gamepad as a joystick.
- Mouse Emulation - Use the Mouse as an emulated Atari device on this port. Only one port may use Mouse emulation at this time.

Other than Mouse Emulation, the same device can be set on more than one port. This

way, if you only have one gamepad, it can be passed around to the four players, if you are playing a game that doesn't require simultaneous use.

When using the HID Controllers, analog joysticks on the controllers will provide port analog input as well, allowing the joystick to be used as a paddle for such games as Super Breakout. In this case, the x-axis will be paddle 1, and the y-axis paddle 2, if the Use X-Axis for both paddles is not checked. If it is, the x-axis will be both paddle 1 and paddle 2.

For each joystick port, you can also set autofire mode. When autofire is on, it can be on only when the joystick button is pressed, or can be on continuously.

Enable Multijoy4 Joysticks for XL/XE Machines

This checkbox enables the emulation of the Multijoy hardware which allowed up to 4 joysticks to be used with custom designed games on the XL/XE series of machines. Normally, XL/XE machines only have 2 joystick ports.

Mouse Emulation

Finally, if one of the joystick ports is set to Mouse Emulation, the Emulated Device pulldown will become active in the Mouse Emulation section. Then, you can choose one of the following Atari devices to emulate with the Mouse:

- None – no device emulated,
- Paddles – analog controllers. The paddles are simple potentiometers, attached two to one Atari port. Each paddle has single button. Horizontal mouse position and left button is mapped to the first paddle, vertical position and right button to the second paddle. The paddles are used mostly in games (e.g. Arkanoid, SuperBreakout, Kaboom). The checkbox at the bottom of the page lets you specify that Horizontal mouse position is used for both the first and second paddles.
- Atari touch tablet – a controller, which returns position of where it has been touched. It has two buttons, which are mapped to your mouse buttons. The touch tablet is used mostly in graphics editors,
- Koala Pad – a device very similar to the touch tablet. The only difference is that it has reverse up/down orientation,
- Light pen – it's a pen, with which you can draw directly on the TV screen (its button presses when you touch the screen). The mouse controls the position of light pen. The left mouse button is the light pen's button. The right mouse button can be used to display mouse cursor, which is useful if an Atari program doesn't display it,
- Light gun – works similarly to the light pen. The difference is that button (trigger) signal is inverted,
- Amiga mouse – the standard mouse used with Commodore Amiga computers. This device can be attached to an 8-bit Atari and is used by some software. As in the real Atari, only the left mouse button can be used,
- Atari ST mouse – the standard mouse used with 16-bit Atari ST computers. The device is very similar to the Amiga mouse, and only left button can be used as well,
- Atari trak-ball – a track-ball device. Similar in operation to Atari ST mouse,
- Joystick – the mouse emulating a joystick. This device can be used with all

software using normal Atari joystick.

There are extra parameters available to adjust the function of some of the emulated devices. They are:

Speed of Emulated Device

If the controller moves too slow or too fast, use the Speed of emulated device option. Also, in Full Screen mode, libSDL on the Macintosh does not allow the Mouse to be grabbed. This may cause the emulated device to not be able to reach the full limits of the Atari Screen. To fix this, increase this value. On my system, using Kensington Mouse Works with a fair amount of acceleration, a value of 15 in this field works nicely for full screen.

Minimum and Maximum Values

For Paddles, the Atari touch tablet and the Koala Pad you can specify the range of controller values.

Horizontal and Vertical Offset

You can calibrate the Light pen and the Light gun using Horz/Vert offsets. You should change these values if the program you're using indicates the pen/gun is in different location than the mouse pointer (right-click to toggle displaying of mouse pointer).

Intertia of Emulated Joystick

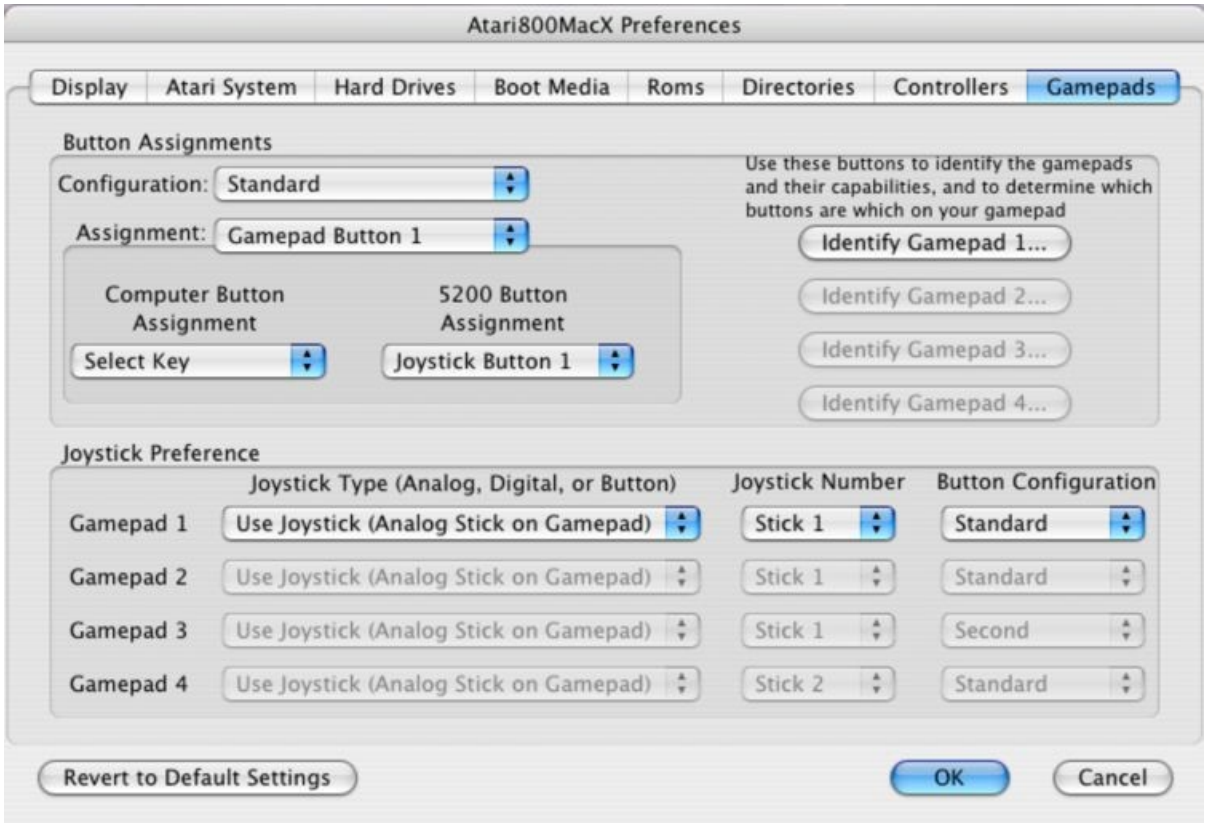
The Inertia of emulated joystick option is available only for the emulated Joystick. It indicates how far the pointer can move on a single mouse movement. This is because the joystick is a digital device (moved in a certain direction or not), while the mouse is analog and can move in a direction faster or slower. This will set how far you have to move the device to get a digital indication of movement in that direction.

Use X-Axis of Joystick/Mouse Emulation for Both Paddles in a Paddle Set

Checking this box allows X-Axis motion on an analog joystick or the mouse emulation to be used for both Paddle 1 and Paddle 2. This overcomes the unusual motion required for the second player to move the joystick or mouse vertically to control a horizontal paddle in games such as Super Breakout. In the unchecked mode, Horizontal (x-axis) motion is tied to paddle 1, and Vertical (y-axis) motion is tied to paddle 2.

5.9 Gamepads Tab

The Gamepads Tab allows the buttons on Joysticks or Gamepads to be assigned to Atari Controller Buttons or keypresses. It also allows the user to specify if analog or digital joysticks/hats on gamepads are used to emulate the Atari joysticks. Note, the emulator only scans for Gamepads when starting up, so Gamepads plugged in during operation will not be recognized. You must quit the emulator, and rerun it to have them recognized.



Button Assignment

These controls allows the user to assign Atari buttons or key presses to up to 24 gamepad buttons. Use the Assignment pulldown to select the gamepad button to assign. Then the user can assign a different Atari control to that gamepad button for Computer (400/800) mode, and for 5200 mode. Once assignments are made, configurations must be saved using the Save or Save As item of the Configuration Pulldown. Saved configurations are then assigned to specific gamepads in the Joystick Preference section below.

One of the types of Atari controls that may be assigned to gamepad buttons is joystick directions. This is used for gamepads such as the iStick, which have a set of four buttons for use as directional buttons, but these buttons do not identify themselves as a digital hat. You may assign the joystick directions to buttons in this section, then select Gamepad Buttons as the joystick type in the section below.

The user may also use the "Identify Gamepad ...." buttons to bring up a

window which will allow them to determine which buttons are which on the Gamepads. This window also gives the name of the gamepad, as well as showing how many buttons, analog, and digital joysticks it has. If a particular Gamepad is not plugged in, it's button will be greyed out.

Joystick Preference

These controls allow you to do things:

- Specify which type of joystick is used on each Gamepad to simulate the Atari joystick/paddle.
- Specify which Analog joystick or Digital Hat to use, if your gamepad has more than one.
- Specify the Button Assignment configuration to assign to each gamepad.

There are 3 types of Gamepad devices that may be used to simulate the joystick. The first is an analog joystick. The second is a digital hat. And the third, is a set of gamepad buttons assigned in a Button Assignment Configuration above. The second of the two pulldowns for each gamepad in this section chooses the type of joystick to use for that gamepad. If Analog joysticks or Digital Hats are not present on your gamepad, their menu items will be disabled, or greyed out. Digital Hats and Gamepad Buttons are not useful for simulating paddles, as they only have 3 positions, far left, far right, and centered.

The second pulldown allows you to select from more than one joystick or hat on your gamepad, if they are present.

The button assignment pulldown allows you to assign a button configuration to each Gamepad. The Standard configuration assigns the joystick trigger to each button. The other custom configurations may be created in the Button Assignment section above.

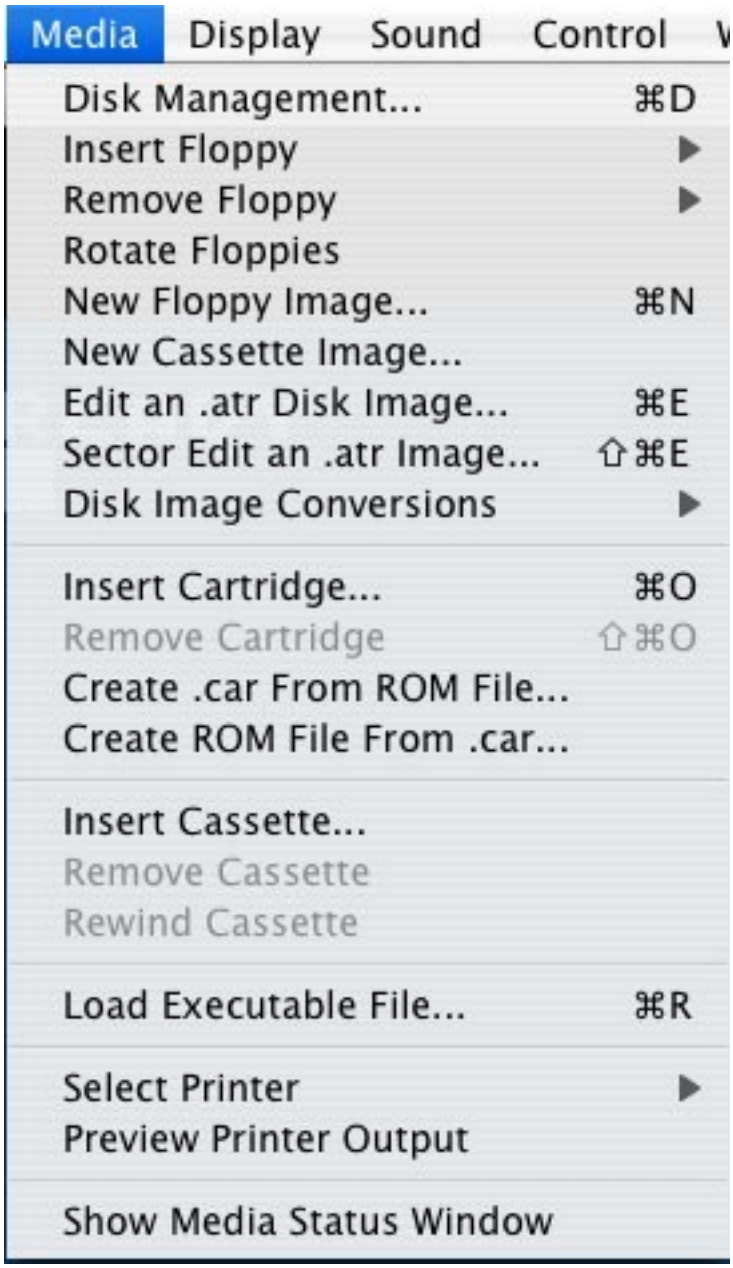
6.0 Menus

The Atari800MacX program provides control of the emulator through the familiar Macintosh menu interface. It provides a standard application menu, with Preferences and Hide items, four program specific menus, as well as the standard Window and Help menus.

In addition, since Macintosh style menus are not available in the Fullscren environment, the traditional Atari- screen based user interface of the Atari800 emulator is provided by Atari800MacX, so you don't have to switch back to windowed mode just to insert your favorite cartridge or disk image.

Detailed descriptions of the options on the four menus are available through the following sections:

6.1 Media Menu



The Media menu on the Atari800MacX emulator allows you to insert and remove digital media into the emulator, the same way you would on a real Atari. It has the following menu selections:

Drive Management (cmd- D)

This menu item supplies access to a full Disk Drive Management window which allows you to insert and remove disks in all 8 disk drives, as well as manage the status of the emulated drives. Details on it's operation can be found in section 6.1.1.

Insert Floppy (cmd-1 through cmd-8)

This sub-menu allows you to insert an image file into any of the 8 emulated disk drives. A .atr, .dcm, or .xfd file may also be loaded into the emulator by double-clicking it in the finder, or dragging it to the Atari800MacX Icon.

Remove Floppy (ctrl-cmd-1 through ctrl-cmd-8, and ctrl-cmd-0)

This sub-menu allows you to remove a image file from one of the emulated disk drives, or you may empty all of the drives at once.

Rotate Floppies

This menu item rotates the current inserted floppies among the drives. This may be useful for playing multiple disk games.

New Cassette Image

This item will create a new cassette file in the .cas format. You will be prompted for the name of the new file, and then it will be created and inserted into the cassette player.

Edit an .atr Disk Image

This menu item allows you to edit a Atari floppy disk image in the .atr format. For more details on the editor, see section 8.0, Disk Editor.

Sector Edit an .atr Disk Image

This menu item allows you to edit a Atari floppy disk image in the .atr format. For more details on the editor, see section 9.0, Sector Editor.

Disk Image Conversions Submenu

This menu item allows you to convert between the various types of Atari disk image formats. You may convert .atr images to .xfd, .dcm, or .scp types. You may also convert .xfd, .dcm, and .scp images to .atr.

Insert Cartridge (cmd-C)

This menu item allows you to insert a cartridge into the emulator. If it is a raw ROM dump of the cartridge, you will need to select the cartridge type from the displayed dialogue. If it is a .car file, then this step will not be necessary. A .car, .rom, or .bin file may also be loaded into the emulator by double-clicking it in the finder, or dragging it to the Atari800MacX Icon.

Remove Cartridge (shift-cmd-C)

This menu item allows you to remove an inserted cartridge from the emulator.

Create .car From ROM File

This menu item allows you to convert a .car Cartridge file into a raw ROM dump, removing the cartridge type information.

Create ROM File from .car

This menu item allows you to convert a raw ROM dump of a cartridge into a .car format file, which contains the cartridge type information, which will allow you to not have to specify this when you insert the cartridge.

Insert Cassette

This menu items allows you to insert a cassette image file (.cas) into the emulator. The emulator supports reading and writing from/to cassette images. A .cas file may also be loaded into the emulator by double-clicking it in the finder, or dragging it to the Atari800MacX Icon. Once the cassette is started by holding start during reboot, or by using the CLOAD/CSAVE basic call, you must press the space bar to continue loading/saving the file.

Remove Cassette

This menu item allows you to remove an inserted cassette from the emulator.

Rewind Cassette

This menu item allows you to rewind the cassette inserted into the emulator, moving the current read pointer back to the first block.

Load Executable File

This menu item allows you to directly load an Atari executable file into the emulator, with using a DOS file system. This executable binary will exist as a file in the Macintosh environment, not on a disk image. A .XEX file may also be loaded into the emulator by double-clicking it in the finder, or dragging it to the Atari800MacX Icon.

Select Printer

This sub-menu item allows you to allows you to chose which printer emulation you are using. You may choose the Text Printer, Atari 825, Atari 1020, or Epson FX-80. The sub-menu also has an option to reset the printer, which is equivalent to turning the printer off and on. For more info on Printer Emulation, see the Printer Emulation help page. For setting the printer options, see the Printer Tab in Preferences.

Preview Printer Output

This menu item is used to view what the current printer output looks like. It is active for every printer emulation except the Text Printer.

Show Media Status Window

This menu item allows to display the Media Status Window if it has been closed. For more information on this window, see the Media Status Window help page.

6.1.1 Drive Management Window

The Drive Management window allows the user to easily see what floppy disk images are in each drive. You may also select a new image by simply clicking on the button with the drive number in it.

Drive Status

Each Disk drive can have one of four states:

- Off - This disk drive has the power turned off.
- Empty - The power is on to the drive, but it has no disk.
- Read Only - A disk is inserted, but has write protect switch on, so that you may only read from the disk.
- R/W - A disk is inserted, and can be either read from or written to.

The Read Only and R/W status of the drive may be set after a disk is inserted.

Eject All

This button allows the user to eject all 8 disks from the drive with one action.

Save Disk Set Button

This button allows the user to save the names of the disk images that are currently in the drives to a file, to be loaded later. The file that the set is save in has an extension of ".set", and it is a human readable text file, containing the paths of the image files, or "Empty" or "Off" for a drive that has no disk.

Load Disk Set Button

This button allows the user to load a disk set saved earlier with the Save Disk Set Button. The user is allowed to browse for the set file, displaying files ending in ".set". The emulator then loads the disk images specified in the file into the corresponding drives. If a drive in the set file is "Empty" or "Off", no changes are made to the drive. This allows the user to load multiple disk sets sequentially.

Rotate Floppies Button

This button rotates the current inserted floppies among the drives. This may be useful for playing multiple disk games.

New Disk Image Button

This button will display a new window which you may use to create a new disk image. This new image will be saved in .atr format.

In the Create Disk Image window, you may choose a format of a disk. Note that not all formats are supported by all Atari DOSes. There are three standard formats:

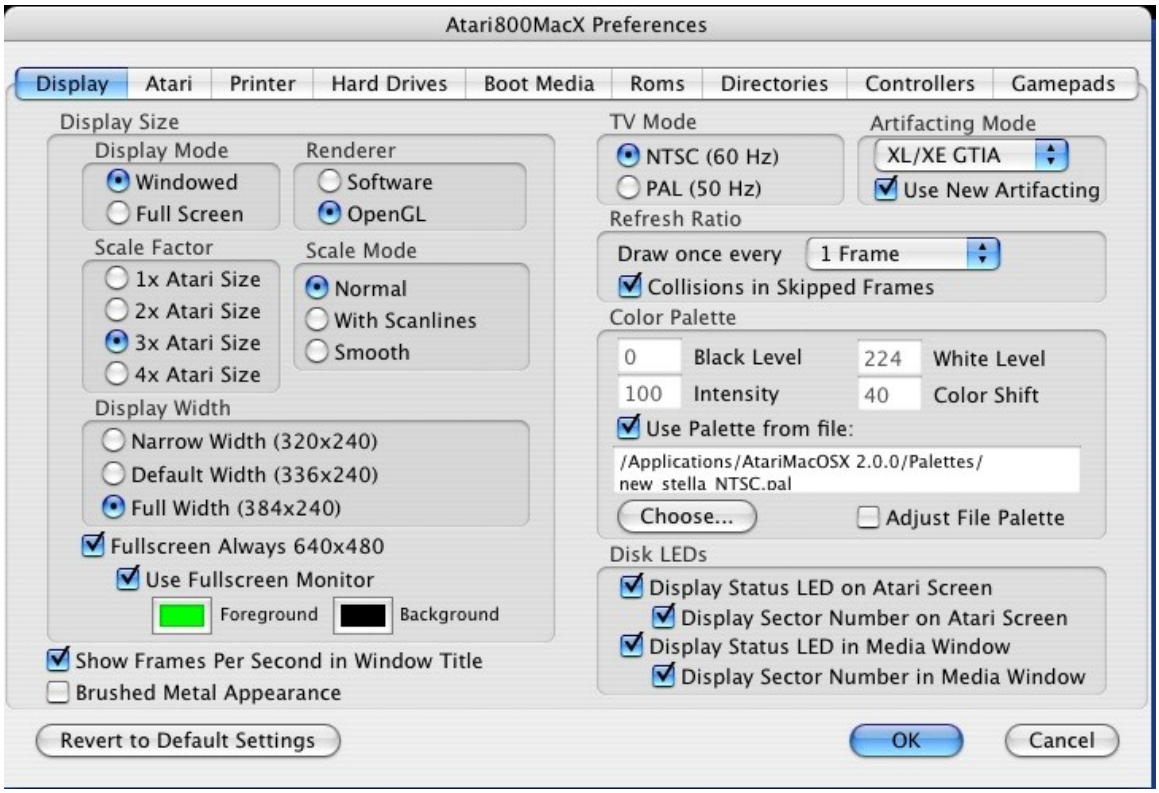
- Single density (40 tracks * 18 sectors/track * 128 bytes/sector = 90 KB)
- Medium density (40 tracks * 26 sectors/track * 128 bytes/sector = 130 KB)
- Double density (40 tracks * 18 sectors/track * 256 bytes/sector = 180 KB)

You can also select any other format, by clicking Custom and setting Number of sectors and Bytes per sector. Please make sure your Atari DOS supports this format, otherwise the image will be unusable.

If 256 bytes per sector are selected, you can choose between 128 and 256 Bytes in boot sectors. Physically, boot sectors (first three sectors on a disk) are also 256 bytes long, but only 128 are transmitted between the Atari and a disk drive (upper halves of sectors are not used). There are disk images with 128 bytes in boot sectors and disk images with 256 bytes in boot sectors. The Atari800 emulator supports both, but other emulators don't. Except some special cases, we recommend 128 for ATR images.

If the "Insert New Disk image into drive" checkbox is checked, the created image will be mounted on the specified drive.

6.2 Display Menu



The Display menu on the Atari800MacX emulator allows you to control the format of the display, grab the mouse input for mouse emulation, and take screenshots of the Atari screen. It has the following menu selections:

Display Scale Factor Submenu

This submenu allows you to chose the scale factor that is used to display the emulated Atari screen in the window. You may chose the display to be either 1x, 2x, 3x, or 4x the size of the Atari screen. This may also be set on the Display Tab page of the Preferences Window.

Display Width Submenu

This submenu lets you set the width of the emulated Atari screen in the window. You may choose between narrow, default, and full widths of the Atari screen. These correspond to 320x240, 336x240, and 384x240 respectively. This may also be set on the Display Tab page of the Preferences Window.

Scaling Mode Submenu

This Submenu lets chose the type of scaling to be applied to the screen. Normal mode displays the screen without any smoothing or scanlines. Scanline mode inserts scanlines as they might have appeared on old classic monitors or TV displays. Smoothing mode applies a smoothing algorithm to the scaline, resulting in rounding in the scaling. Note, however, that the smoothing mode can consume large quantities of processing time, slowing the emulation down. You may want to check if you are able to run at full frame rate in this mode by using the "Show Frames Per Second" menu item. This may also be set on the Display Tab page of the Preferences Window.

Artifacting Mode Submenu

This submenu lets you set choose how the emulator simulates Artifacting, which occurred when the original Atari used a TV for displaying its video. Some games depended on the colors these Artifacting effects produced. This may also be set on the Display Tab page of the Preferences Window.

Toggle Fullscreen mode (cmd-F)

This menu item allows you to toggle the display between Fullscreen and Windowed modes. More info on screen modes can be found on the Display Tab page of the Preferences Window.

Toggle FPS Display on/off (cmd-K)

This menu item allows you toggle on or off the display of the emulators frames per second in the Window Title.

Grab Mouse mode on/off (F16)

This menu item toggles the emulators to control of the mouse for using it as an emulated Atari controller. More information on Mouse emulation can be found on the Controllers Tab of the Preferences Window.

Screenshot (F13)

This menu items allows you to take a screenshot of the Atari screen. It will be stored as a .PCX format file in the same directory as the emulator executable. Future versions of the emulator may use a more Macintosh graphics format, but for now this is the format the graphics core uses. The great Shareware program Graphic Converter may be used to read this format.

6.3 Sound Menu

The Sound menu on the Atari800MacX emulator allows to the sound aspects of the emulator. It has the following menu selections:

Enable/Disable Sound

This menu item allows you to toggle the emulator sound on/off.

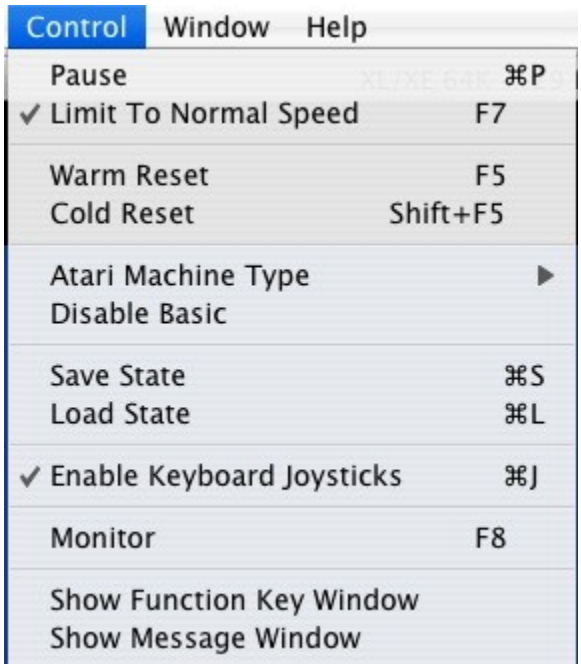
Stereo/Mono Sound

This menu item allows you to toggle the emulator sound between Stereo and Mono. It defaults to Mono. This setting does not change how sound is played on your Mac, in other words, sound always comes out both speakers. Stereo is only used for demos and other applications that are designed to run on modified Atari computers that have a second Pokey chip added to them. It you set the sound to stereo for normal games, sound will only come out of one speaker.

Start/Stop Sound Recording

This menu item allows you to stop or stop recording of the sound. It will be stored as a AIFF format sound file in the same directory as the emulator executable.

6.4 Control Menu



The Control menu on the Atari800MacX emulator allows the user to pause, control the speed, reset, and save/load the state of the emulator. It has the following menu selections:

Pause (cmd- P)

This menu item allows you to toggle the Pausing of emulation.

Limit To Normal Speed (F7)

This menu item allows you to limit the speed of the emulator to the classic Atari speed of 50 or 60 frames per second (depending on the TV mode, NTSC or PAL), or allow the emulator to run as fast as the Macintosh is capable. This setting is also on the Display Tab of the Preferences Window, and defaults to limiting the speed of the emulator.

Warm Reset (F5)

This menu item allows you to do a warm reset on the emulator, the equivalent of pressing reset on the Atari.

Atari Machine Type Submenu

This submenu item allows you to select the type of Atari computer which is emulatod. The type of computer may also be chosen in the System Tab of the Preferences Window.

Disable Basic

This menu item allows you to disable Atari BASIC on Cold Restart's. Also, if you want to disable Atari BASIC on Warm Restarts, there is an option that allows you to do this as well in the System Tab of the Preferences Window. Note, that the real Atari's didn't work this way, but it can be much more convient.

Cold Reset (shift-F5)

This menu item allows you to do a warm reset on the emulator, the equivalent of cycling power on the Atari

Save State (cmd-S)

This menu item allows you to save the state of the emulator, so that it may be loaded later with the Load State command. Disk images and cartridges inserted into the computer are stored in the state file. The state is stored in a .a8s file that may also be double-clicked or dragged to the Atari800MacX icon in the Finder, or to the main Atari800MacX window, to load the state.

Load State (cmd-L)

This menu item allows you load a state file (.a8s) previous saved with the Save State command. Note, the state file format was changed to fix a serious error with saved cartridges and disk images, and the format in version 1.4.0 and later is not compatible with 1.3.0 and earlier, so old state files will not load into the new emulator and visa versa.

Enable Keyboard Joysticks (cmd-J)

This menu item is used to enable or disable keyboard joysticks. If any of the controllers are set to keyboard joystick control, setting this to enable will use the keys defined for them as joystick keys. Setting it to disabled will allow the keys to be passed to the emulator as normal keystrokes. This is enabled by default.

Monitor (F8)

This menu item invokes monitor console, to be used for debugging Atari programs, viewing memory contents and other advanced actions. Type help to display list of available monitor commands, type cont to close the monitor console and continue emulation.

Show Function Key Window

This menu item makes the Function Key Window active. It provides a way to press the select, start, and option Atari keys from the screen, as opposed to using the keyboard. (F2-F4). The window that is displayed looks like:

Show Message Window

This menu item shows the message window which will display status/startup information about the emulator, and any serious error messages encountered during emulation will be displayed here. The author may use this tool with you to debug difficult, or non-repeatable issues

6.5 Fullscreen User Interface

While in Fullscreen mode, the Atari800MacX uses the user interface built into the standard Atari800 emulator. It is a character based UI on the Atari screen itself. The main menu is accessed by pressing F1. From there, the arrow keys may be used to navigate the menus, and Esc will go back up a menu level. Keyboard shortcuts show on the first screen (F1) are listed as pressing the Alt key. As this was designed for DOS systems, substitute the Command keypress.

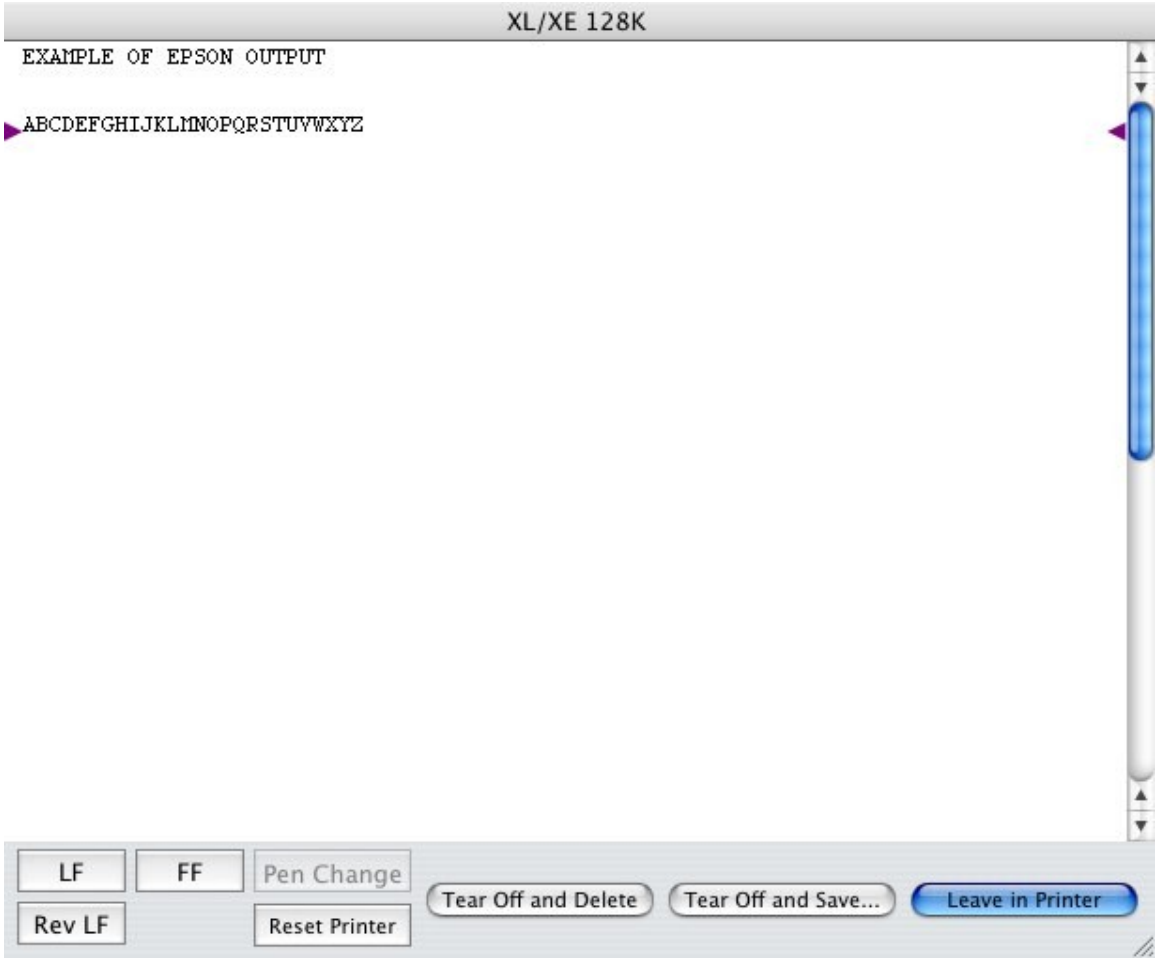
Although this interface is more primitive than the full featured Macintosh interface, it was left in the Fullscreen mode, so that a user does not have to change back to Windowed mode to make a simple change to the emulator. Note the keycodes for shortcuts in the Windowed mode have been designed to duplicate the Fullscreen key shortcuts where possible.

7. Printer Emulation

The Printer Tab controls the type of printer emulation that is used for outputting to the P: device from the emulated Atari. Note, that the P: Patch must be enabled on the Atari System Tab for this tab to be active.

The are four choices for printer emulation, Text Printer, Atari 825, Atari 1020, and Epson FX-80. The Text printer simply sends the printer output to a text file with optional script processing, while the other three choices emulator a legacy printer, and allow the user to save the printer output in a PDF file. For information on setting printer options, see the Printer Tab (section 5.3) of the Preferences pane. The current printer can be selected, and preview output opened, by either an entry in the Media Menu (section 6.1)or by using the printer area in the Media Status Window. (section 4)

The legacy printer emulations allow the user to preview what has been printed to the printer so far. This preview is presented as a pane which drops down from the main emulator window, and is shown below. Besides previewing the output, there are controls that allow the user to control the emulated printer and output



While the preview is open, the printer is offline, and the main emulator is paused. The printer comes back online when the preview sheet is closed.

The preview shows the printed output on one or more pages of fanfold paper. The length of one page can be chosen in the Printer tab of the Preferences panel, and is 11 inches by

default. Two purple triangles, on the left and right hand side of the paper, indicate the "current position"; this is where the next line of output will appear. Breaks between the pages will appear as dotted lines, simulating the perforations in fanfold paper. These dotted lines will not appear in the output.

At the bottom of the sheet are several buttons:

- Leave in Printer: pressing this button closes the preview sheet without affecting the output.
- Tear Off and Save: this button saves the print output in a pdf file. It then clears the print output from the preview and closes the sheet. So metaphorically this is like tearing off the fanfold paper and storing the output in a safe place. After saving the output to a pdf file you can use Apple's Preview program or Adobe Acrobat Reader to view the output or print it on a real printer.
- Tear Off and Delete: this clears the output without saving it and closes the sheet.
- LF: Line Feed, This will cause the current position of the printer to advance by one line.
- Rev LF: Reverse Line Feed, This will cause the current position of the printer to go back by one line.
- FF: Form Feed, This will cause the current position of the printer to advance to the top of the next page.
- Pen Change: This is only active for the Atari 1020 printer, and will cause the printer to use the next pen color. The current pen color in use is indicated by the color of the text in the button.
- Reset Printer: This is equivalent to power cycling the emulated printer, reseting any control characters that may have been sent by the emulated computer. It will also clear the print output, start at the top of a blank page, and close the preview window.

Text Printer

The Text Printer is used to send output to a plain text file. The file will be stored in the default print output directory, which is settable on the Directories Tab (section 5.7) of the Preferences window. The file name will be automatically generated, and will be off the form SPOOL_xxxxx, where xxxxx is a random character string picked by the program/OS. The file may then be post- processed by a shell command, which is specified on the Printer Tab (section 5.3) of the Preferences window. By default, the text file is opened in TextEdit.

Epson FX-80 Printer

The Epson FX-80 was a very popular printer in the 1980's, and is therefore supported by many Atari programs.
The emulation is intended to support all of the functions of the original printer, such as different character pitches, bold, italic and underlined text, margins, tabs, and graphic modes. It does not support user defined characters however. It does support proportional printing well, as opposed to the Atari 825 emulation's proportional print support, which is poor.

The technology used by the emulator for text rendering is very different from the technology used in the original Epson. As a result, the characters are somewhat different, but the size and looks of the characters are just like the real thing,

Atari 1020 Printer/Plotter

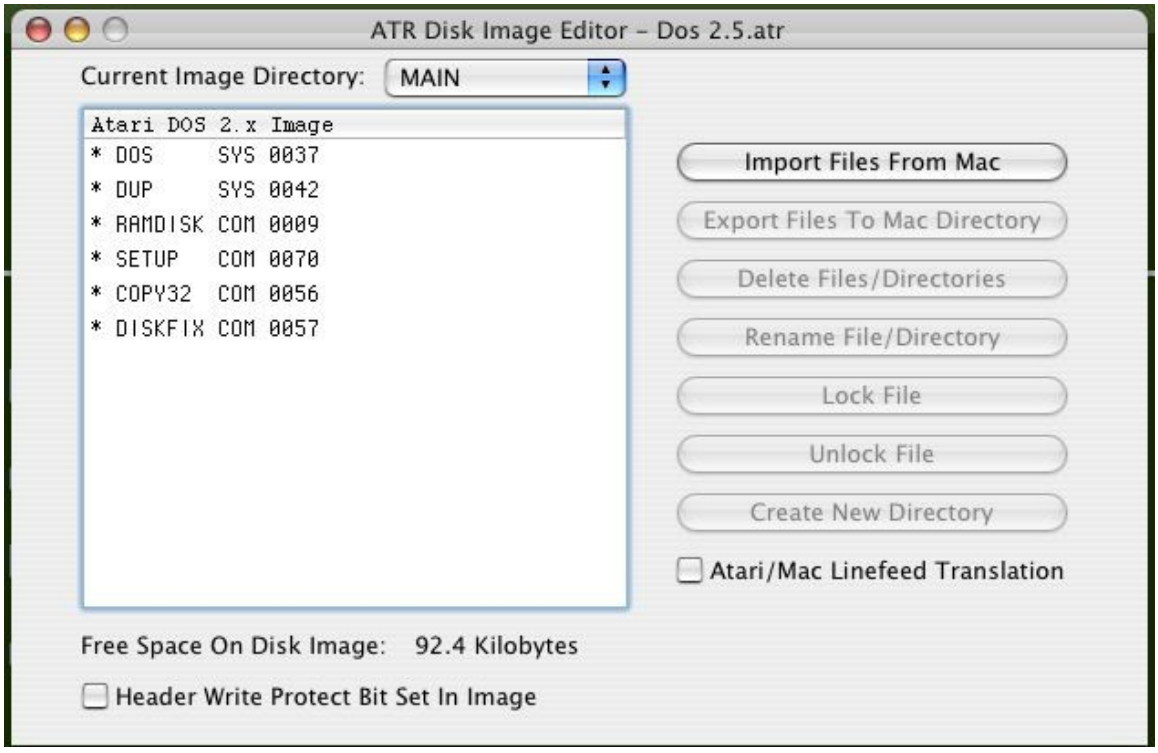
The Atari 1020 was a unique printer/plotter with color output, which was rare in the day. The emulation is intended to support all of the functions of the original printer, and even includes the additional ability to change the colors of the 4 pens in the plotter.

Atari 825 Printer

The Atari 825 was on of several standard Atari printers. It's emulation is included here for use with early programs which might not have had printer driver support for the Epson. The emulation is intended to support all of the functions of the original printer, however, proportional output on the printer used a spacing which is not easily emulated with modern fonts, so the output appearance is not optimal. It is strongly suggested to use the Epson emulation for proportional text output instead.

8. Disk Image Editor

The Disk Image Editor on the Atari800MacX emulator allows you to edit a ATR disk image that is formated with any of the supported Atari DOS formats. You may Import and Export files from/to the Mac file system, as well as manipulate files and directories on the image. The supported Atari DOS types are Atari DOS 1.0, Atari DOS 2.x, Atari DOS 3.0, Atari DOS 4.0, Atari DOS XE, TopDOS, BiboDos, MyDos, SpartaDos 2+, and BWDOS. When you select the Edit Disk Image menu item and pick a disk image to edit, you get a window like the one shown below. You may open multiple disk images at once, and even drop and drag files between them.



The Disk Editor has the following elements:

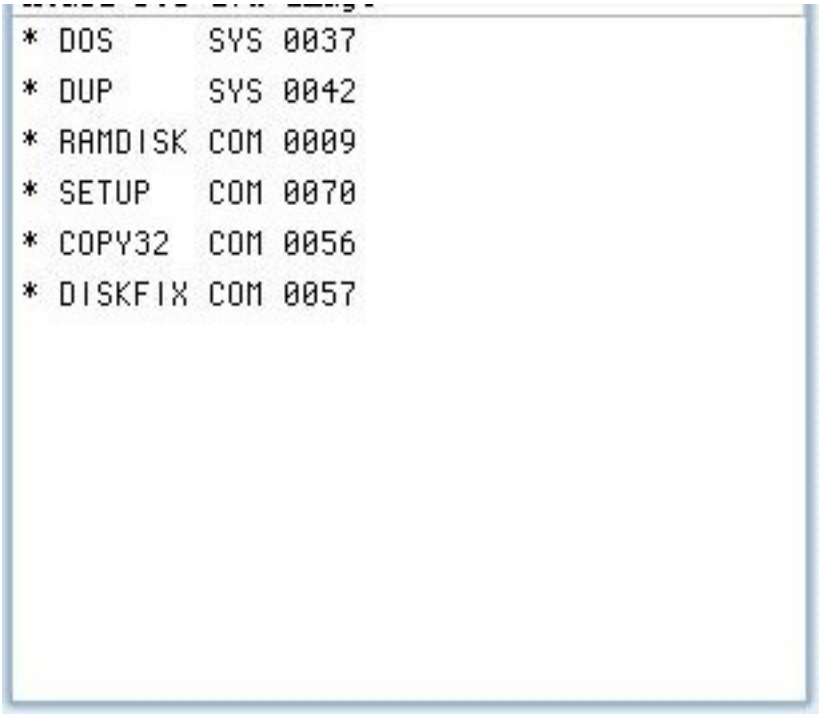
Image Type

The top of the file list view displays the type of DOS the image was formatted with.

Current Image Directory

This pulldown displays the current directory on the disk image. If the image does not support disk directories, this will be MAIN. You may navigate to a lower disk directory by double clicking on the directory name in the file list. To navigate back up the directory tree, you may use this pulldown to select the directory to move to.

File List



This area lists the files in the current directory, in a format similar to that used by the DOS type for that image. Files may be dragged and dropped to/from a Finder window to import/export the files. Files may also be dragged and dropped between disk editor windows. Dragging of Directories is not supported.

Free Space

This displays the amount of free space on the disk image in Kilobytes, not sectors or blocks.

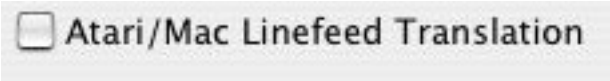
Header Write Protect Bit Set In Image

This checkbox displays the state of the Write Protect bit in the header of the ATR image. You may change it by clicking on the checkbox. Normally, if this is set, it will prevent the emulator and other programs from writing to the image. However, don't confuse this with the permissions on the file image in the MacOSX operating system, as they are separate.

Action Buttons

These buttons are used to perform operations on selected files in the File List. If they are not active, it may be that no files are selected, the wrong file types are selected for the operation (directories), or the disk may be write protected, either by the operating system, or by the ATR header write protect bit. (Note for a directory to be deleted, it must be empty.)

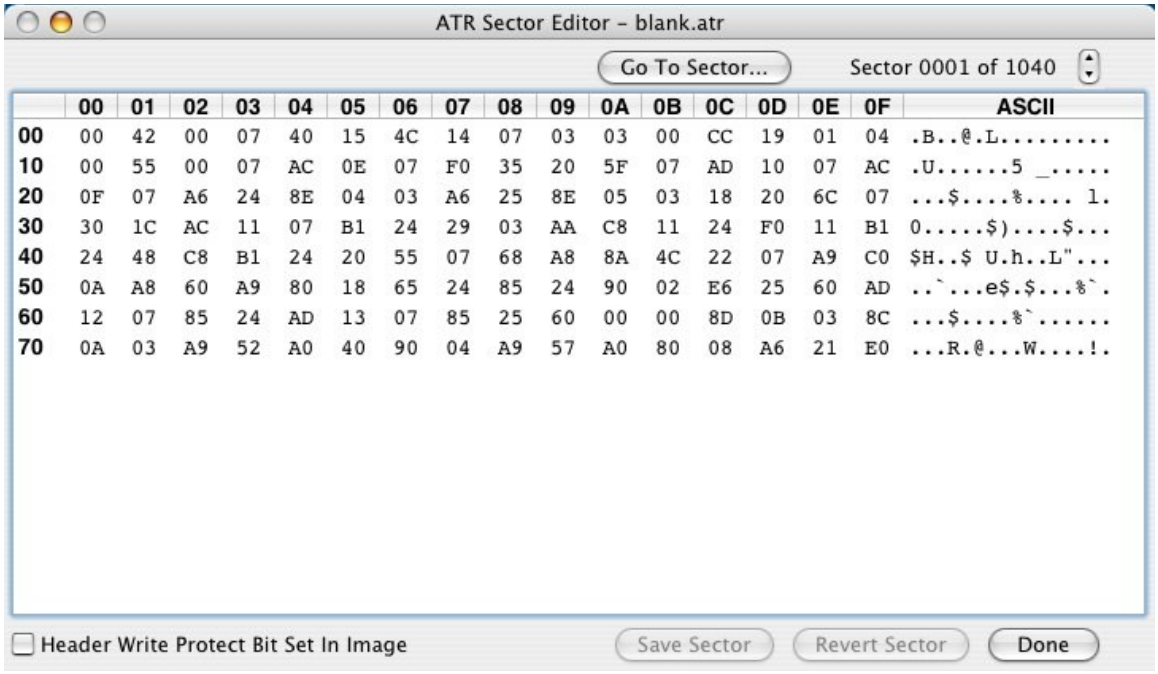
Linefeed Translation



This checkbox turns the translation of Atari Linefeed characters on or off for Import/Export operations to the Mac File system.

9. Sector Editor

The Sector Editor on the Atari800MacX emulator allows you to edit a ATR disk image at the byte level, sector by sector. You may only open one sector editor at a time, and it runs modally when you do. You may not open a ATR image in the sector editor that is already open by the Disk Image editor. You can open an image that is mounted in the emulator drive, but be very careful if you do, as the two processes may corrupt the image. The emualtor should not be accessing the image when you change it. The sector editor will handle both single and double density images, displaying the proper number of bytes per sector for each (128 or 256). Note even a double density desk only has 128 bytes per sector for the first 3 sectors, the boot sectors.



	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	ASCII
00	00	42	00	07	40	15	4C	14	07	03	03	00	CC	19	01	04	.B..@.L.....
10	00	55	00	07	AC	0E	07	F0	35	20	5F	07	AD	10	07	AC	.U.....5 _.....
20	0F	07	A6	24	8E	04	03	A6	25	8E	05	03	18	20	6C	07	...$....%.... l.
30	30	1C	AC	11	07	B1	24	29	03	AA	C8	11	24	F0	11	B1	0.....$)....$...
40	24	48	C8	B1	24	20	55	07	68	A8	8A	4C	22	07	A9	C0	$H..$ U.h..L"...
50	0A	A8	60	A9	80	18	65	24	85	24	90	02	E6	25	60	AD	..`...e$.$...%`.
60	12	07	85	24	AD	13	07	85	25	60	00	00	8D	0B	03	8C	...$....%`......
70	0A	03	A9	52	A0	40	90	04	A9	57	A0	80	08	A6	21	E0	...R.@...W....!.

The Sector Editor has the following elements:

Byte Editing Table

This table allows you to edit each hex byte in the sector that is displayed. The row and column numbers are displayed in bold, and the editable bytes in normal text. You may edit a byte by double clicking on it, as long as the image is not read only or protected by the header write protect bit. (If an image is a read only file on the Mac, it will be noted as such in the editor window title.) You can also edit the ASCII representation of the hex bytes on the right hand side of the table. Editing one representation will change the other automatically.

Sector Number to Edit

You can change the sector being edited by pressing the sector stepper by the sector number either up or down, or by pressing the Go To Sector.... button, which will display a sheet where you enter the number. The number must be between 1 and the number of sectors in the disk, which is displayed between the two controls. If

the sector you are currently editing has not been saved, it will prompt you if you want to discard the changes and move to the new sector anyway.

Saving and Reverting

You can save your editing changes to a sector by pressing the Save button (or Cmd-S). You can discard the changes and revert to the sector on disk by pressing the Revert button. These buttons are only active when the sector data has been changed.

Done with editing

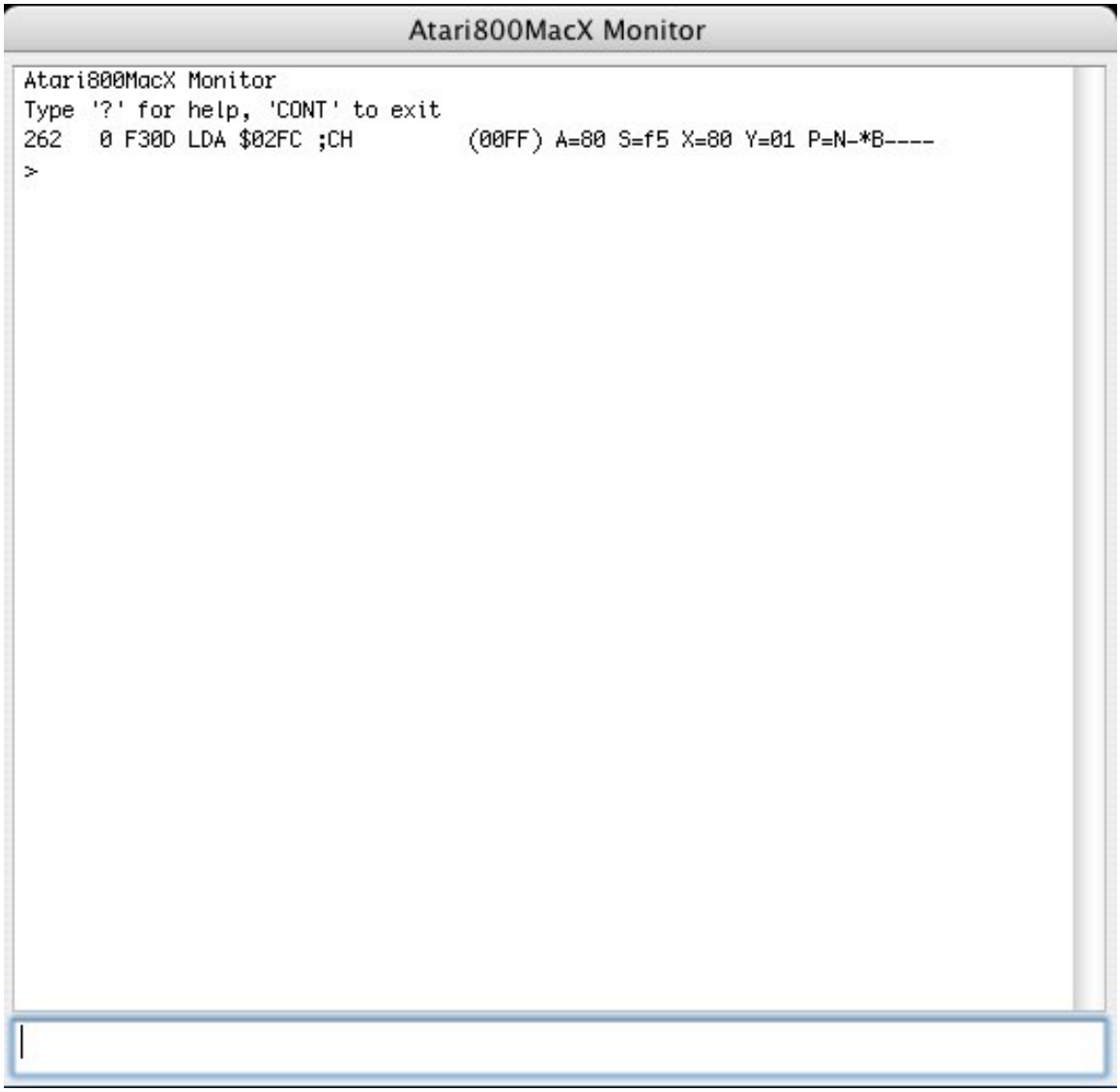
You can exit the editor by pressing the done button. If the sector you are currently editing has not been saved, it will prompt you if you want to discard the changes and exit the editor anyway.

Header Write Protect Bit Set In Image

This checkbox displays the state of the Write Protect bit in the header of the ATR image. You may change it by clicking on the checkbox. Normally, if this is set, it will prevent the emulator and other programs from writing to the image. However, don't confuse this with the permissions on the file image in the MacOSX operating system, as they are separate.

10. Debug Monitor

The Debug Monitor on the Atari800MacX emulator allows you to debug programs written for the Atari800 on the emulator. With it you can single step programs, display memory, set breakpoints, and much, much more. To access the debugger, simply press F8 while the emulator is running. It will bring up the following window in windowed mode:



or, if you are in Fullscreen mode, and Fullscreen Monitor is enabled in the Display Tab of the Preferences, the following will be displayed:

Commands are typed in the input box at the bottom of the window, and are executed by pressing return. There is also command history, so you can get to commands you have entered before with the up an down arrows. To exit the monitor and continue your program, use the command 'cont'. To get a list of all of the commands, and simple help on them type 'help' or '?'. To quit the emulator from the monitor screen, type 'quit'.

Whenever the monitor stops, it prints out the processor's current status. In the above example, the line is:

```
262   2 F2FD LDA $02FC ;CH    (00FF)  A=ff S=f5 X=80 Y=01 P=--*B--ZC
```

The meaning of the fields in this line are as follows:

262	Vertical scan position when processor was stopped
2	Horizontal scan position when processor was stopped
F2FD	Current value of the Program Counter
LDA $02FC	Disassembly of the instruction at the PC location
;CH	A symbol that is referenced by the instruction ($2FC in this case)

```
(00FF)              Value at memory location referenced by instruction,
                     or in the case of a conditional branch, a Y or N
                     which indicates if the branch will be taken.  In
                     this case $02FC contains 00FF.
A=ff S=f5 X=80 Y=01 Current value of the other processor registers
P=--*B--ZC          Current value of the processor flags.
```

The full set of commands and an explanation of their use follows. A parameter in brackets [] means that it is optional:

10.1 Monitor Control Commands

HELP
?

Print a list of all commands plus a brief description of each.

CONT

Exits the monitor and continues emulation

QUIT

Quit the emulator.

COLDSTART,

Execute a coldstart on the emulator, and leave the monitor.

WARMSTART,

Execute a warmstart on the emulator, and leave the monitor.

10.2 Processor Related Commands

SHOW

Shows the current state of processor registers. (The display is similar to the line displayed when the monitor is entered.

SETPC hexval
SETA hexval
SETS hexval
SETX hexval
SETY hexval

Set the processor register (PC, A, S, X, or Y) to the hexadecimal value specified by *hexval*.

SETN
SETV
SETD
SETI
SETZ
SETC

Set the specified flag (N,V,D,I,Z, or C).

CLRN
CLRV
CLRD
CLRI
CLRZ
CLRC

Clear the specified flag (N,V,D,I,Z, or C).

10.3 Memory Commands

C startaddr hexval...

Change memory starting at the hexadecimal address specified by *startaddr* with a series of bytes specified by *hexval*. For example, the command "C 0 00 01 02" would set the byte at address 0 to 0, address 1 to 1, and address 2 to 2.

D [startaddr]

Disassemble memory starting at hexadecimal address *startaddr*. If *startaddr* is not specified, then disassembly will continue from the last disassembled location.

F startaddr endaddr hexval

Fill memory starting at hexadecimal address *startaddr* and ending at address *endaddr* with the hex byte value specified by *hexval*.

M [startaddr]

Display memory starting at *startaddr* location. If *startaddr* is not specified, then memory dumping will continue from the last dumped location.

MM srcaddr destaddr bytecnt

Move *bytecnt* bytes of memory starting at address *srcaddr* to address *destaddr*. Memory move will handle overlapping regions correctly, reversing the order of copying as needed.

S startaddr endaddr hexval...

Search memory from *startaddr* to *endaddr* for a sequence of bytes specified by the hexadecminal values that follow.

STACK

Show the current stack contents. Each JSR that has occurred will show it's calling location and the called subroutine. Parameters that have been passed on the stack are shown separately. The following is an example:

```
> stack
01F6 : 5E F2    F25C : JSR F2FD
01F8 : EE E6    E6EC : JSR E6F4
01FA : D2 E5    E5D0 : JSR E6EA
01FC : F6 BD    BDF4 : JSR BD0F
01FE : 70 A0    A06E : JSR BDED
```

ROM startaddr endaddr

Convert memory from address *startaddr* to address *endaddr* to be considered by the emulator as ROM

RAM startaddr endaddr

Convert memory from address *startaddr* to address *endaddr* to be considered by the emulator as RAM

HARDWARE startaddr endaddr

Convert memory from address *startaddr* to address *endaddr* to be considered by the emulator as HARDWARE

BANK [banknum]

Switch current memory bank in use to *banknum*. If the parameter is omitted, then show the current bank number. (XE systems)

READ file startaddr nbytes

Read from the host file named *file* into memory starting at *startaddr* for *nbytes* bytes

READSEC drive sector count addr

Read *count* disk sectors starting at sector number *sector* from drive number *drive* into memory at address *addr*.

WRITE startaddr endaddr [file] [init>0] [run>0]

Write memory from *startaddr* to *endaddr* to a file. If the *file* parameter is specified, it is used as the filename, otherwise "memdump.dat" is used. The two other optional parameters *init* and *run* specify the initialization and run address

used for a Atari binary loadable file. If either of *init* or *run* is specified, the Atari binary file header is written before the data.

WRITESEC drive# count addr

Write *count* disk sectors starting at sector number *sector* and drive number *drive* from memory starting at address *addr*.

SUM startaddr endaddr

Add the bytes of memory from *startaddr* to *endaddr* and display the result as a 32 bit sum.

10.4 Tracing and Execution Control Commands

TRON file

Turn tracing of instructions to a file on. The instruction trace is saved in a file named *file*. Each line of the file represents the log of execution of one instructions, and is similar to the line displayed when the monitor is entered.

TROFF

Trace instruction tracing previously turned on with the TRON command off.

BREAK [addr]

Set a simple breakpoint at the address specified by *addr*. If *addr* is omitted, then display the currently set breakpoint, if any. Specifying a value of zero for *addr* will turn a previously enabled breakpoint off.

YBREAK [pos]

Set a scanline breakpoint at scanline *pos*. If *pos* is omitted, the current scanline breakpoint setting will be displayed. If *pos* is -1, the breakpoint will be disabled. Specifying a value for pos of a scanline + 1000 will cause that scanline to flicker when it is displayed. For example, ybreak 1100 will cause scanline 100 to flicker.

BRKHERE [on|off]

Sets BRK opcode behavior to stop in the monitor (on) or not (off).

MONHIST [on|off]

Turn monitor history keeping on/off. Keeping history will slow down the emulation, so this allows the debugger to only keep the history when the programmer needs it. See the HISTORY command next.

HISTORY

H

Display disassembly of last 32 PC address executed if monitor history keeping has been turned on with MONHIST. Display is the same format as displayed when the monitor is entered.

JUMPS

List last 32 locations of JMP/JSR

G

Single step one instruction and return to the monitor.

O

Step over the instruction, which is used to step over subroutine jumps.

R

Execute until a return instruction is executed and return to monitor.

B

Complex Breakpoint Commands. Complex breakpoints function through a breakpoint table made up of possibly many breakpoint conditions. The breakpoint checking has been optimized to have as little impact on emulation execution speed as possible, however all of the conditions may be checked each emulated cycle, and the memory location conditions are especially processor intensive. Each condition (entry) is explicitly anded with the next, so that a breakpoint only fires if all of the entries are true. However, the exception to this is the OR condition, which allows you to have several chains of anded conditions ored together. An example follows at the end of the subcommand descriptions. A

description of each subcommand follows:

B

Using the B command without a subcommand will print out the current breakpoint table.

B ?

This will print out a brief help summary on the complex breakpoint commands.

B C

This subcommand will clear all breakpoints in the table.

B D num

This subcommand deletes one entry in entry in the breakpoint table, whose number is *num*. Breakpoint table entries are numbered starting at 0.

B ON

The on subcommand with no parameters turns the entire breakpoint table ON. Individual breakpoint table entries must also be on for them to be active.

B ON num1 [num2 ...]

The on subcommand followed by breakpoint table entry numbers turns the entries associated with those numbers on. This allows the user to enter breakpoint entries, and turn them on and off individually.

B OFF

The off subcommand with no parameters turns the entire breakpoint table OFF. This means that even if the individual breakpoint table entries are on, no breakpoints will fire.

B OFF num1 [num2 ...]

The off subcommand followed by breakpoint table entry numbers turns the entries associated with those numbers off. This allows the user to enter breakpoint entries, and turn them on and off individually.

B [num] cond1 [cond2 ...]

This subcommand is used to insert breakpoint table entries. If the option *num* parameter is specified, the entries will be inserted at that breakpoint number, and existing entries will be shifted to higher numbers. If *num* is not specified, or is higher than the highest entry plus one, the entry will be added at the end of the table. A condition (*cond1*, *cond2*) is on of the following:

TYPE OPERATOR VALUE

This triplet of type operator value is entered with no spaces in between the three components.

Where TYPE is:

PC, **A**, **X**, **Y**, **S**, **READ**, **WRITE**, or **ACCESS**

Where OPERATOR is:

<, **<=** , **=** , **==** , **>** , **>=** , **!=**. or **<>**

And finally VALUE, in hex, is what TYPE is compared to.

For example:

PC=1000	Will break when the program counter is 1000
A<45	Will break when the accumulator is less than 45
X>=4	Will break when the x register is greater than or equal to 4
Y!=2	Will break when the y register is not equal to 2

S==1F6 Will break when the s register is equal to 1f6
READ<1000 Will break when a memory address less than 1000 is read
WRITE>2000 Will break when a memory address greater than 2000 is written.
ACCESS==200 Will break when memory address 200 is read or written

MEM ADDR OPERATOR VALUE

Where MEM is a constant string 'MEM'.
Where ADDR is the memory address, in hex, whose contents is to be compared.
Where OPERATOR is:
<, <= , = , == , > , >= , !=. or <>
And finally VALUE is what the contents of the memory, in hex, is compared to.
For example:
MEM100=45 Will break when the program counter is 1000
MEM1000>78 Will break when the accumulator is less than 45

SETN
SETV
SETB
SETD
SETI
SETZ
SETC

The condition breaks when the processor flag specified is set.

CLRN
CLRV
CLRB
CLRD
CLRI
CLRZ
CLRC

The condition breaks when the processor flag specified is clear.

OR

The OR condition is a special case and indicates that the break will fire when the conditions prior to it in the breakpoint table occur *or* the conditions after it occur. There can be multiple OR's in the breakpoint table.

Finally, here are some examples of the B commands:

B PC>=203f A<3a OR PC=3a7f X<>0

Creates a breakpoint table with 5 entries. Note that ands are implied between conditions, so this table says the breakpoint will fire if condition1 AND condition2 occur OR condition4 AND condition5 occur.

B 2 MEM1000=4a

Adds a new entry on position 2

B D 1

Deletes entry on position 1

B OR SETD

Adds 2 new entries at the end of the table

10.5 Atari Hardware Register Commands

ANTIC
GTIA
PIA
POKEY

Display hardware registers for a specific chip.

DLIST [startaddr]

Show the Display List starting at address *startaddr*. If *startaddr* is not specified, it will show the display list continuing from where it was last displayed.

DLIST CURR

Show the Display List from the currently in use location.

10.6 Assembler Commands

A [startaddr]

Start simple assembler, with assembled code being stored at *startaddr*. The assembler is exited by entering a blank line.

LABELS file

Load labels from an assembler output file (xasm format)

11. File Types

The Atari800MacX emulator supports the file types listed below. Each of these file types may be double clicked or dragged onto the Atari800MacX icon. If they are double clicked, and the emulator is not running, it will be started.

If it is a disk image file, it will be loaded into the first disk drive, and the computer reset. Cartridge files will be inserted into the Atari. Cassette images will be placed into the Atari Cassette drive. Executable binary files will be loaded into the Atari and run. Saved State files will restore the Atari to a known state. (Note: If you want to double click a state file to start the emulator, you should have set the required Boot Media in the preferences pane before quitting, and media are not saved in the state file by the Emulator Core at this time.)

Disk Images:

The emulator supports ATR, DCM, and XFD images. The emulator only creates ATR images. Valid extensions are .atr, .ATR, .dcm,.DCM, .xfd, .XFD, .atz, .ATZ, .xfz, .XFZ . (The last four are zipped images).

Cassette Images:

The emulator supports CAS images. The file extension is .cas or .CAS.

State Files:

The emulator supports A8S state files. Note this format is not guaranteed to not change between versions of the Atari 800 Emulation core. Therefore, states saved with one version of the emulator may not be loadable in another. The file extension is .a8s or .A8S.

Color Palette Files:

The emulator supports ACT color palette files. ACT files are standard palette files of 256 RGB colors. Each color is defined by a byte of Red, followed by a byte of Green, followed by a byte of Blue. An ACT file must be 256*3=768 bytes long. The file extension is .act or .ACT.

Executable Binary Files:

The emulator supports XEX Atari executables state files. This is a standard Atari binary, just renamed on the Macintosh disk to either a .xex or .XEX extension.

Cartridge Images:

The emulator supports both raw ROM dump images (ROM and BIN) and the CART format. The CART format and types are explained below. The valid file extensions are .rom, .ROM, .bin, .BIN, .car, and .CAR.

The advantage of using CART files is that you don't have to select the cartridge type, because it is stored inside the file.

The CART format has been introduced in Atari800 0.8.0, when there were only 4 supported cartridge types. The format has not changed, only new typeshave been added.

The format is:
first 4 bytes containing 'C' 'A' 'R' 'T'.
next 4 bytes containing cartridge type in MSB format (see the table below).
next 4 bytes containing cartridge checksum in MSB format (ROM only).
next 4 bytes are currently unused (zero).
followed immediately with the ROM data: 4, 8, 16, 32, 40, 64 or 128 kilobytes.

The recommended file name extension for CART files is CAR.

Currently supported cartridge types:

Id	Machine	Size	Name
1	800/XL/XE	8	Standard 8 KB cartridge
2	800/XL/XE	16	Standard 16 KB cartridge
3	800/XL/XE	16	OSS '034M' 16 KB cartridge
4	5200	32	Standard 32 KB 5200 cartridge
5	800/XL/XE	32	DB 32 KB cartridge
6	5200	16	Two chip 16 KB 5200 cartridge
7	5200	40	Bounty Bob Strikes Back 40 KB 5200 cartridge
8	800/XL/XE	64	64 KB Williams cartridge
9	800/XL/XE	64	Express 64 KB cartridge
10	800/XL/XE	64	Diamond 64 KB cartridge
11	800/XL/XE	64	SpartaDos X 64 KB cartridge
12	800/XL/XE	32	XEGS 32 KB cartridge
13	800/XL/XE	64	XEGS 64 KB cartridge
14	800/XL/XE	128	XEGS 128 KB cartridge
15	800/XL/XE	16	OSS 'M091' 16 KB cartridge
16	5200	16	One chip 16 KB 5200 cartridge
17	800/XL/XE	128	Atrax 128 KB cartridge
18	800/XL/XE	40	Bounty Bob Strikes Back 40 KB cartridge
19	5200	8	Standard 8 KB 5200 cartridge
20	5200	4	Standard 4 KB 5200 cartridge
21	800	8	Right slot 8 KB cartridge
22	800/XL/XE	32	32 KB Williams cartridge
23	800/XL/XE	256	XEGS 256 KB cartridge
24	800/XL/XE	512	XEGS 512 KB cartridge
25	800/XL/XE	1024	XEGS 1 MB cartridge
26	800/XL/XE	16	MegaCart 16 KB cartridge
27	800/XL/XE	32	MegaCart 32 KB cartridge
28	800/XL/XE	64	MegaCart 64 KB cartridge
29	800/XL/XE	128	MegaCart 128 KB cartridge

30	800/XL/XE	256	MegaCart 256 KB cartridge
31	800/XL/XE	512	MegaCart 512 KB cartridge
32	800/XL/XE	1024	MegaCart 1 MB cartridge
33	800/XL/XE	32	Switchable XEGS 32 KB cartridge
34	800/XL/XE	64	Switchable XEGS 64 KB cartridge
35	800/XL/XE	128	Switchable XEGS 128 KB cartridge
36	800/XL/XE	256	Switchable XEGS 256 KB cartridge
37	800/XL/XE	512	Switchable XEGS 512 KB cartridge
38	800/XL/XE	1024	Switchable XEGS 1 MB cartridge
39	800/XL/XE	8	Phoenix 8 KB cartridge
40	800/XL/XE	16	Blizzard 16 KB cartridge
41	800/XL/XE	128	Atarimax 128 KB Flash cartridge
42	800/XL/XE	1024	Atarimax 1 MB Flash cartridge

Id is the cartridge type code stored in the CART file.

Machine indicates if the cartridge is for Atari 8-bit Home Computers (400/800 and XL/XE) or the Atari 5200 Game System.

Size is length of image in kilobytes.

Below are descriptions of all types. For bank-switched cartridges bank A stands for the first bank in the image, bank B is the second, etc.

Type 1: Standard 8 KB cartridge

Standard 8 KB cartridge, that occupies 8 KB of address space between $A000 and $BFFF.

Type 2: Standard 16 KB cartridge

Standard 16 KB cartridge, that occupies 16 KB of address space between $8000 and $BFFF.

Type 3: OSS '034M' 16 KB cartridge

There are two types of OSS cartridges. Both are 16 KB and occupy 8 KB of address space between $A000 and $BFFF. The cartridge memory is divided into 4 banks, 4 KB each. One bank ('main') is always mapped to $B000-$BFFF. The other 3 banks are mapped to $A000-$AFFF. The current bank is selected by accessing a byte in $D500-$D5FF. Only 4 lowest bits of

address are significant.

The '034M' scheme is the more complicated one.
The main bank is D. An access to:
$D5x0 or $D5x1 selects bank A.
$D5x3 or $D5x7 selects bank B.
$D5x4 or $D5x5 selects bank C.
$D5x2 or $D5x6 is not useful. It disables ROM (there're $FF bytes in $A000- $AFFF).
$D5x8- $D5xF disables whole cartridge (enables computer's memory in address space between $A000 and $BFFF).

+----------+
| Type 4: Standard 32 KB 5200 cartridge
+----------+

Standard 32 KB cartridge for Atari 5200, that occupies 32 KB of address space between $4000 and $BFFF.

+----------+
| Type 5: DB 32 KB cartridge
+----------+

A 32 KB bank- switched cartridge. There are 4 banks. Bank D is mapped to $A000- $BFFF. Bank in $8000- $9FFF is selected by an access to $D500- $D5FF. Two lowest bits of address select bank A, B, C or D.

+----------+
| Type 6: Two chip 16 KB 5200 cartridge
+----------+

In Atari 5200 there's 32 KB of address space reserved for the cartridge ($4000- $BFFF). A two chip 16 KB cartridge is mapped that way:
- First 8 KB are mapped into lower 16 KB. Since an address line is not connected, $4000- $5FFF and $6000- $7FFF contain same data, which is first half of the cartridge image.
- Similarly, second 8 KB are mapped into upper 16 KB.

+----------+
| Type 7: Bounty Bob Strikes Back 40 KB 5200 cartridge
+----------+

The cartridge with "Bounty Bob Strikes Back" game uses very strange bank switching method:
- Four 4 KB banks (A,B,C,D) are mapped into $4000- $4FFF. An access to $4FF6 selects bank A, $4FF7 - bank B, $4FF8 - bank C, $4FF9 - bank D.
- Four 4 KB banks (E,F,G,H) are mapped into $5000- $5FFF. An access to

$5FF6 selects bank E, $5FF7 - bank F, $5FF8 - bank G, $5FF9 - bank H. - The remaining 8 KB is mapped to upper 16 KB of cartridge address space in Atari 5200. That is, $8000- $9FFF and $A000- $BFFF contain same data.

+- - - -

+- - - -

disabled. Otherwise four lowest bits select the bank mapped to $A000-$BFFF.

+----------+
| Type 18: Bounty Bob Strikes Back 40 KB cartridge
+----------+

The cartridge with "Bounty Bob Strikes Back" game uses very strange bank switching method:
- Four 4 KB banks (A,B,C,D) are mapped into $8000-$8FFF. An access to $8FF6 selects bank A, $8FF7 - bank B, $8FF8 - bank C, $8FF9 - bank D.
- Four 4 KB banks (E,F,G,H) are mapped into $9000-$9FFF. An access to $9FF6 selects bank E, $9FF7 - bank F, $9FF8 - bank G, $9FF9 - bank H.
- The remaining 8 KB is mapped to $A000-$BFFF.

+----------+
| Type 19: Standard 8 KB 5200 cartridge
+----------+

Standard 8 KB cartridge for Atari 5200, mapped into $8000-$9FFF and $A000-$BFFF.

+----------+
| Type 20: Standard 4 KB 5200 cartridge
+----------+

Standard 4 KB cartridge for Atari 5200, mapped into $8000-$8FFF, $9000-$9FFF, $A000-$AFFF and $B000-$BFFF.

+----------+
| Type 21: Right slot 8 KB cartridge
+----------+

8 KB cartridge for Atari 800, mapped into $8000-$9FFF. Atari 800 was the only 8-bit Atari with a Right Cartridge slot, in addition to the Left Cartridge slot as present on all 8-bit Ataris.

+----------+
| Type 22: 32 KB Williams cartridge
+----------+

The cartidge has 4 banks mapped to $A000-$BFFF. An access to $D500 selects bank A, $D501 - bank B, etc. An access to $D508-$D50F disables the cartridge.

+--
----------+
| Type 23: XEGS 256 KB cartridge
+--
----------+

This bank-switched cartridge occupies 16 KB of address space between $8000 and $BFFF. The cartridge memory is divided into 32 banks, 8 KB each. The last bank is always mapped to $A000-BFFF. Five lowest bits of a byte written to $D500-$D5FF select the bank mapped to $8000-$BFFF.

+--
----------+
| Type 24: XEGS 512 KB cartridge
+--
----------+

This bank-switched cartridge occupies 16 KB of address space between $8000 and $BFFF. The cartridge memory is divided into 64 banks, 8 KB each. The last bank is always mapped to $A000-BFFF. Six lowest bits of a byte written to $D500-$D5FF select the bank mapped to $8000-$BFFF.

+--
----------+
| Type 25: XEGS 1 MB cartridge |
+--
----------+

This bank-switched cartridge occupies 16 KB of address space between $8000 and $BFFF. The cartridge memory is divided into 128 banks, 8 KB each. The last bank is always mapped to $A000-BFFF. Seven lowest bits of a byte written to $D500-$D5FF select the bank mapped to $8000-$BFFF.

+--
----------+
| Type 26: MegaCart 16 KB cartridge |
+--
----------+

A 16 KB cartridge, that occupies 16 KB of address space between $8000 and $BFFF, and can be disabled by writing a byte with bit 7 set to $D500-$D5FF.

+--
----------+
| Type 27: MegaCart 32 KB cartridge |
+--
----------+

A bank-switched cartridge that occupies 16 KB of address space between $8000 and $BFFF. It is controlled by a byte written to $D500-$D5FF. Bit 0 selects one of two available banks, bit 7 disables the cartridge.

+--
----------+

| Type 28: MegaCart 64 KB cartridge |
+----------+

A bank-switched cartridge that occupies 16 KB of address space between $8000 and $BFFF. It is controlled by a byte written to $D500-$D5FF. Bits 0 and 1 select one of four available banks, bit 7 disables the cartridge.

+----------+
| Type 29: MegaCart 128 KB cartridge |
+----------+

A bank-switched cartridge that occupies 16 KB of address space between $8000 and $BFFF. It is controlled by a byte written to $D500-$D5FF. Bits 0,1,2 select one of 8 available banks, bit 7 disables the cartridge.

+----------+
| Type 30: MegaCart 256 KB cartridge |
+----------+

A bank-switched cartridge that occupies 16 KB of address space between $8000 and $BFFF. It is controlled by a byte written to $D500-$D5FF. Four lowest bits select one of 16 available banks, bit 7 disables the cartridge.

+----------+
| Type 31: MegaCart 512 KB cartridge |
+----------+

A bank-switched cartridge that occupies 16 KB of address space between $8000 and $BFFF. It is controlled by a byte written to $D500-$D5FF. Five lowest bits select one of 32 available banks, bit 7 disables the cartridge.

+----------+
| Type 32: MegaCart 1 MB cartridge |
+----------+

A bank-switched cartridge that occupies 16 KB of address space between $8000 and $BFFF. It is controlled by a byte written to $D500-$D5FF. Six lowest bits select one of 64 available banks, bit 7 disables the cartridge.

+----------+
| Type 33: Switchable XEGS 32 KB cartridge |
+----------+

This bank-switched cartridge occupies 16 KB of address space between

$8000 and $BFFF. The cartridge memory is divided into 4 banks, 8 KB each. Bank D (the last one) is always mapped to $A000- BFFF. Two lowest bits of a byte written to $D500- $D5FF select the bank mapped to $8000- $BFFF, bit 7 disables the cartridge.

Type 34: Switchable XEGS 64 KB cartridge

This bank- switched cartridge occupies 16 KB of address space between $8000 and $BFFF. The cartridge memory is divided into 8 banks, 8 KB each. Bank H (the last one) is always mapped to $A000- BFFF. Three lowest bits of a byte written to $D500- $D5FF select the bank mapped to $8000- $BFFF, bit 7 disables the cartridge.

Type 35: Switchable XEGS 128 KB cartridge

This bank- switched cartridge occupies 16 KB of address space between $8000 and $BFFF. The cartridge memory is divided into 16 banks, 8 KB each. Bank P (the last one) is always mapped to $A000- BFFF. Four lowest bits of a byte written to $D500- $D5FF select the bank mapped to $8000- $BFFF, bit 7 disables the cartridge.

Type 36: Switchable XEGS 256 KB cartridge

This bank- switched cartridge occupies 16 KB of address space between $8000 and $BFFF. The cartridge memory is divided into 32 banks, 8 KB each. The last bank is always mapped to $A000- BFFF. Five lowest bits of a byte written to $D500- $D5FF select the bank mapped to $8000- $BFFF, bit 7 disables the cartridge.

Type 37: Switchable XEGS 512 KB cartridge

This bank- switched cartridge occupies 16 KB of address space between $8000 and $BFFF. The cartridge memory is divided into 64 banks, 8 KB each. The last bank is always mapped to $A000- BFFF. Six lowest bits of a byte written to $D500- $D5FF select the bank mapped to $8000- $BFFF, bit 7 disables the cartridge.

| Type 38: Switchable XEGS 1 MB cartridge |
+----------+

This bank-switched cartridge occupies 16 KB of address space between $8000 and $BFFF. The cartridge memory is divided into 128 banks, 8 KB each. The last bank is always mapped to $A000-$BFFF. Seven lowest bits of a byte written to $D500-$D5FF select the bank mapped to $8000-$BFFF, bit 7 disables the cartridge.

+----------+
| Type 39: Phoenix 8 KB cartridge |
+----------+

An 8 KB cartridge, that occupies 8 KB of address space between $A000 and $BFFF, and can be disabled by an access to $D500-$D5FF.

+----------+
| Type 40: Blizzard 16 KB cartridge |
+----------+

A 16 KB cartridge, that occupies 16 KB of address space between $8000 and $BFFF, and can be disabled by an access to $D500-$D5FF.

+----------+
| Type 41: Atarimax 128 KB Flash cartridge |
+----------+

This bank-switched cartridge occupies 8 KB of address space between $A000 and $BFFF. The cartridge memory is divided into 16 banks, 8 KB each. The 4 lowest bits of the address written to $D500-$D50F select the bank mapped to $A000-$BFFF. Writing to $D510-$D51F disables the cartridge and any write to $D520-$D5FF is ignored.

+----------+
| Type 42: Atarimax 1 MB Flash cartridge |
+----------+

This bank-switched cartridge occupies 8 KB of address space between $A000 and $BFFF. The cartridge memory is divided into 128 banks, 8 KB each. The seven lowest bits of the address written to $D500-$D57F select the bank mapped to $A000-$BFFF, bit 7 disables the cartridge.

12. Credits

Testing, Feature Suggestion, and General Support of the Atari800MacX Development:

My Wife
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- SIO2PC ATR patch
- SIO Config patches (tested on real XF551)
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- Tidied cartridge code up

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- major improvements of configure & make process
- added copyright headers to all source files
- miscellaneous cleanups and fixes

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- Corrected calculation of ATR sectror count
- UI enhancement (folders in disk management)

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- detailed information about OSS, Williams, XEGS and MegaCart cartridges

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- R-Time 8 cartridge support (real date and time from host machine)
- page based memory access
- PAGED_ATTRIB support

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- Various corrections to MOTIF code.
- MOTIF callbacks for Insert Disk, Eject Disk and Insert ROM
- Bug Fixes in sio.c
- Bug Fix to devices.c allowing DOS 2.5 to get a directory of H:
- Bug Fix to monitor.c (EOF on INPUT + Blank Lines)
- Undocumented commands added to monitors HELP command.
- Implementation of Disable Drive menu item for Motif.
- Fixed scrolling problem for SGI and SPARC machines
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- Changes to pattern matching for H: device.
- Motif fileselector retains state from one invocation to the next
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- Removed Warning messages when compiled with -Wall
- Configuration program detects if longwords need to be aligned.
- Modification to X11 Paddle Emulation.
- Removed annoying flicker present under some X11 platforms.
- Removed hardcoded paths in MOTIF code.
- Various fixes for curses mode.

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- RPM .spec file

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- Tidied up emulator abort code.
- Case insensitive monitor commands.

Piotr Fusik <fox@scene.pl>
- general rewrite of ANTIC and GTIA (accuracy and speed improvements)
- changed ANTIC/CPU synchronization
- corrected undocumented 6502 opcodes
- corrected PCX screenshots and added interlaced screenshots
- improved IRQ accuracy
- ATR write protection
- monitor improvements
- loading of .act palette files
- improved disk LEDs
- rewritten executable loader
- UI enhancements
- read-only mode for H: devices
- exact 17-bit and 9-bit polys for sound and RANDOM
- improved potentiometers emulation
- support for Express, Diamond, SpartaDOS X, XEGS, and other cartridges
- corrected disk formatting
- cassette recorder emulation
- emulation of paddles, Touch Tablet, & Koala Pad
- emulation of Light Pen/Gun & Amiga/ST mice
- util/act2html

Robert Golias <golias@informatics.muni.cz>
- UI enhancements and DJGPP fixes
- Monitor enhancements (esp. line assembler)
- fullscreen in DOS port - 320x240 and 320x480 interlaced graphics
- VESA2 support in DOS
- keyboard and joystick handling, joystick emulated on keyboard

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- initial Mac OSX support
- new complete H: device support (subdirectories added recently)
- Multiple Disk Set support

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- SVGAlib patch for joystick
- BRKHERE command

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- win32 fixes
- sethdr perl script

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- Virtual 2600 Emulator from which I took /dev/dsp device code

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- cpu_m68k.s corrections and improvements
- double buffering of screen output

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- Correction of Antic 4&5 Bug affecting Galactic Chase & Mr. Do
- Improved speed of DOS version by syncing with a high resolution timer
- PORTB duplicated special handling of PORTA.

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- fixed some warnings and bugs (like e.g. void main() in joycfg ;-)

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- research on real cartridges

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- Lookup table containing RGB values for each Atari Colour

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- Win32 port (using DirectX)
- DCM and ZLIB compressed files support

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- Antic fix in vertical scroll
- Complete Antic rewrite (DIRECT_VIDEO approach, but better)
- GTIA enhancements (based on Thomas' code, but using DIRECT_VIDEO)
- Allegro library in DOS port
- Colour Artifacting
- 'digital sound' emulation in DOS port
- complete cycle- exact ANTIC/GTIA emulation

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- Fix for handling 6502 V flag during ADC and SBC operations

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- SaveINT() fix in state save code
- Linux improvements (new svgalib keyboard input and screen output)
- Sound improvements (interpolation, configurable delay, 4 buffers)
- autoconf stuff
- Windows code clean up and DirectX version

Chris Palmer <crpalmer@solo.uwaterloo.ca>
- Spotted incorrect declaration of atari_basic[8129] in "pia.c"

Ivo van Poorten <ipoorten@cs.vu.nl>
- Added X11 window Expose Event
- Made hardware registers repeat within their page.
- Control Characters in CURSES version
- Makefile targets for freebsd systems
- Modification to Curses character attributes handling (for freebsd)
- Ported Emulator to DOS using DJGPP.

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- GTIA collisions and third colour of players
- new SIO code with formatting support
- POKEY timers
- ADC/SBC "V" bit bug found and fixed using Frodo 6502 emu source

Karel Rous <Empty Head>
- rewrote CPU.C to optimized MC68030 assembler

Neil Ship <nlshipp@dictator.uwaterloo.ca>
- Correction to new cartridge code introduced in 0.4.0

Ken Sider
- his binary loader has been used by Rich for developing our EXE LOADER

Petr Stehlik <pstehlik@sophics.cz>
- Project coordinator/manager since v0.8.2 (spring of the 1998)
- Added support for Atari Falcon (port itself, sound, kbd, joy)
- Added sound, keyboard and joystick support for DOS version
- Snailmeter
- Various fixes in the SDL version
- Atari800 project web pages at http://atari800.sourceforge.net/
- RT- Config fixes (per- user and system wide config, Y/N questions)

Radek Sterba <raster@infos.cz>
- Added all missing CPU 6502 instructions
- Implemented precise timing into Antic and CPU
- Fixed PMG registers and implemented PMG flickering
- Added full 256 opcodes support to dissasembler
- Various DOS enhancements
- Added emulation of 320 kB memory (Atari320XE)

Petr Sumbera <xsumbe00@stud.fee.vutbr.cz>

- LPTjoy idea and design of the interface

Vasyl Tsvirkunov <vasyl@pacbell.net>
- WinCE port of Atari800
- refactored UI (introduced UI_BASIC)

Marek Zelem <marek@formax.elf.stuba.sk>
- little improvements in SIO and main sync loop for Unix
- X11 keyboard
- X11 screen (background => faster emulation)
- digital (volume only) sound
- console sound emulation
- disk drive sound emulation
- various fixes

Marcin Zukowski <eru@ibb.waw.pl>
- fix in ANTIC, GTIA
- slight monitor improvement

Benjamin Schreiber <fishy_PKAT151@gmx.de>
and Alexander Martinez <kubus3561@gmx.de>
- SDL keyboard joystick emulation stored in the Atari800 config file

Daniel Serpell <daniel_serpell@yahoo.com>
- SDL keyboard based on Unicode values, more keys emulated correctly

Ken Zalewski <kennyz@nycap.rr.com>
- segfault fix in GetKeyCode of atari_x11

maddoxik <maddoxik@funnyvoid.com>
- "Make Blank Boot Disk" option added to Disk Management UI

13. Compatibility

Years of development of the Atari800 emulator by different people have it running almost 100% of Atari software. Take it into consideration before you complain ‘The program x doesn’t work with the emulator’. Most of non-working programs we receive are corrupt. They can’t be run on a real Atari computer, thus they don’t work with the emulator.

The emulator’s compatibility rate is growing continuously. You can help us by reporting any non-working software. Please check this first. This is the list of all known bugs in the emulation. Some others may have crept in during the development of the Macintosh version, but are not known at this time.

A few keyboard-related bugs:
- e.g. pressing SHIFT+1 and then releasing SHIFT should still give '!' characters

The cycle-exact ANTIC/GTIA/CPU timing is not 100%.
This causes display bugs in following programs:
- Surf's up (game) (The horizon)
- Dimension X (game) (alignment problem? not tested on actual machine)
- Te.mod (demo) (small glitched pixel in the final credits on the bottom left)
- The break(demo) (bug may exist in the original, check)
- Our 5oft Unity Part (demo) (cycle-alignment, probably WSYNC)
- Isolation (demo) (vector animations)

Non-bugs:
- Mail Order Monsters (game)
  (some colour changes do not align with text, occurs on a real Atari)

The following programs are improved by using the new cycle-exact code
- 8 Players Demo (demo)
- Bewesoft's Demo (demo)
- Bitter Reality (demo)
- Demonic Laughter (music collection)
- Extract (graphics collection)
- GED (graphics editor)
- Joyride (demo)
- Mail Order Monsters (game)
- Master of the Lamps (game)
- Orneta '95 invitro (demo)
- Our 5oft Unity Part (demo)
- Studio Dream (demo)
- Sweet Illusion (demo)
- Te.mod (demo)
- The Break (demo)
- Miner 2049'er (game) (rotating 5's)
- Dimension X (game) (title screen upper and lower bars)
- Graphics impossible (demo) (Antic magazine)

(not tested:)
- Power Graph (graphics editor)
- Darkness Warrior (picture)

POKEY interrupts are scanline-, not cycle-exact.

This causes sound bugs in following programs:
- Joyride (demo) (white lines on title picture)
- Mirax Force (game)
- Saturday Demo (demo)
- The Last Guardian (game)

Sound emulation is not accurate enough

This causes sound bugs in following programs:
- Numen (demo)

Sound emulation uses VOL_ONLY_SOUND hack.

This causes sound bugs in following programs:
- Digital Trash (demo)
- Ghostbusters (game)
- Overmind (demo)

Intensive 130xe- banks switching slows down emulation much.

This causes performance problems in following programs:
- Impossible but Real (demo)
- Sheol (demo)
- Total Daze (demo)
- Ultra (demo)

14. Known Bugs

The following are known bugs in this release:

- Normal keyboard shortcuts for the Copy and Select All items in the Edit menu do not work in the Messages window. However, the menu equivalents do work
- Directories used for storing media and emulator files must not have non 7-bit ASCII characters in their filenames. The emulator core uses standard UNIX file handling routines, and does not handle international characters.

15. Release History

Version 3.5.0 Release 10-31-2006
Features Added/Changed:

- Added support for the new SpartDos X 128K Cartridge.
- Added menu to the Control Menu to allow the user to control the artifacting mode.
- Allow gamepads with 3 joysticks of the same type to be used (Gravis Eliminator Aftershock is an example).

Bugs Fixed:

- Fixed issue with "new" artifacting in certain games, such as SCRAM..
- Fixed issue where Artifacting mode was not taking effect until program was restarted (After being set in Media Status Window)..

Version 3.4.3 Release 10-22-2006
Bugs Fixed:

- Fixed issue with Gamepad Identification window, where Test and OK buttons did not work.

Version 3.4.2 Release 09-27-2006
Bugs Fixed::

- Fixed bug where Mouse pointer was stuck in Emulator window when returning from Full Screen mode to Windowed mode.
- Fixed issue with Screenshot capture on Intel Macs. (TIFF File was being stored in little endian format)

Version 3.4.0 Release 09-18-2006
Features Added/Changed:

- Added pulldowns to the Media Status Window which allow the user to control machine type, screen scaling, screen width, and artifacting from there in addition to using the menus or keyboard.
- Added the ability for the emulator to remember what media was present (disks, cassette, and/or cartridge) when it quit, and restore them the next time it starts up. This is added as a checkbox to the Boot Media panel of the Preferences.
- Added the ability for the emulator to remember what media was present (disks, cassette, and/or cartridge) when it quit, and restore them the next time it starts up. This is added as a checkbox to the Boot Media panel of the Preferences.
- Added ability to control emulation speed from 10-300%, as opposed to either 100% or Full Speed. There is now a slider on the Atari panel of the Preferences.
- Added the Break key to the Function Key window, for those with International laptop keyboards which might not have had the other keys.

Bugs Fixed:

- Fixed bug where Mouse Emulation modes were not working properly..
- Fixed issue with International and Dvorak keyboards where Command key combinations were not being released properly, and keys were missed, or

keyboard joysticks did not work correctly.

Version 3.3.0 Release 06-11-2006
Features Added/Changed:

- Updated to the 1.2.10 release of libSDL, which includes official Universal Binary support.
- Added new, realistic artifacting type. This produces much clearer text, and correctly varies luminance and displays player missile graphics in artifacted mode.

Bugs Fixed:

- Fixed bug which would not allow keys used for joystick emulation to be used to type filenames in Fullscreen UI.
- Fixed upside down printing of text in Epson and Atari825 Printer Emulators on OS X 10.3 and 10.4. Note, this is now broken on OS X 10.2, but this was determined to be a more acceptable solution than ending support for 10.2. 10.2 users may continue to use version 3.2 or earlier with working Printer support.

Version 3.2.0 Release 03-25-2006
Features Added/Changed:

- Application is now a Universal Binary, and should run natively on Intel based Macs.
- Added true Volume Only sound to "Hi-Fi" sound mode, so that games such as Bezerk and Nexuss now have correct sound, removing "hiss" from that old sound was causing in those games.
- Added ability to go to/from fullscreen mode using Cmd-Return, as well as Cmd-F. Most other emulators use that key sequence for full screen.
- Updated code base to core emulator Atari800 2.0.1 release + CVS Changes.

Bugs Fixed:

- Fixed improper screen redraw when exiting GUI in full screen mode.
- Fixed fullscreen GUI from running too fast when Limit Speed feature was off.
- Fixed issue with Sirus games by incorporating Atar800 CVS changes.

Version 3.1.0 Release 02-23-2006
Features Added/Changed:

- Integrated new Warm Reset handling from Atari800 2.0.1
- Integrated new Hard Disk emulation from Atari800 2.0.1
- Added NTSC palette files.
- Cleaned up autoswitching between computer and 5200 modes, so that switching occurs from 5200 mode when user inserts computer media (catridge, disk, executable file).
- Added menu in preferences so that user could select which computer type is

switched to when user inserts computer media (cartridge, disk, executable file), when emulator is in 5200 mode.

Bugs Fixed:

- Fixed slashed zeros in Epson Printer Emulation
- Fixed Atari 1020 Printer Emulation issue of crashing when print with auto adjust is on.
- Fixed handling of Ctrl-Shift and certain key combinations, enabling such programs as Paperclip and Extended DDT.
- Fixed issue where machine was not reintialized when OS ROM was changed.
- Fixed issue where window title bar was not updated when autochanging modes between computer and 5200.
- Fixed issue where machine type menu was not updated when autochanging modes between computer and 5200.
- Fixed issue where emulated screen was not cleared properly when autochanging modes between computer and 5200.

Version 3.0.0 Release 09-29-2005

Features Added/Changed:

- Added OpenGL rendering for improved performance and improved compatibility with OSX 10.4 and above.
- Added Printing to a choice of 3 simulated legacy printers, with output to PDF files.
    - Epson FX-80 - Text and Graphics dot matrix printer supported by most later Atari software.
    - Atari 1020 - Color printer/plotter.
    - Atari 825 - Early Atari dot matrix printer included for use with early Atari software.
- Added Function Key window to allow user to press Atari Start, Select, and Option keys from floating palette.
- Added enhancements to the built-in debug monitor.
    - Ability to run in Fullscreen.
    - Command history
    - Read/Write emulator memory from/to Macintosh files.
    - Read/Write emulator memory from/to Atari disk image sectors.
    - Memory Move
    - Bank Switching (XE)
    - Complex Breakpoints
    - Instruction Tracing to Files
    - Improvements to the History command
- Added the ability to create blank Cassette images.
- Added the following features from Core Emulator version 1.3.6+
    - Loading of BASIC files from Loading executable file menu item
    - Added new Atarimax cartridge types
    - Bug fixes

Bugs Fixed:

- Added Fix for Sound issues on certain classes of machines. Sound should now be much more stable.
- Added Fix for Atari control key not working properly when using international keyboard mapping.
- Added Fix for some Preferences not getting saved when changed by emulator menus.
- Added Fix for bug where screenshots taken in 16 bit colors would be all black.
- Added Fix for garbage being displayed in emulator window after retuning from Fullscreen.
- Added Fix in Disk Editor for issue recognizing Atari Dos type on some enhanced density disk images.

Version 2.1.0 Release 03-07-2005
Features Added/Changed:

- Added the ability to insert and remove joysticks and gamepads while the emulator is running, and it will recognize the change.
- Added the ability to choose a brushed metal apperance for all the emulator windows in the Display tab of the preferences. The emulator must be restarted for a change in this setting to take full effect.
- Added the ability to specify the directory in which Screenshots are stored.

Bugs Fixed:

- Added Fix for Timeslip game from core emulator. Newcycleexact dmactl change bug.
- In full screen menuing system, fixed NULL pointer access in file dialog which happened if there were no files in the selected directory.
- Fixed cartridge bank switching to switch back the main bank of switchable XEGS cartridges.

Version 2.0.0 Release 05-25-2004
Features Added/Changed:

- Added Media Window which provides a graphical representation of the status of the following:
    - Disk Drives
        - Shows the state of the disk drive, and the name of the image file inserted, if any.
        - Allows the user to turn the drive on/off, insert/eject disk images, and write protect (lock) and unlock the disk images.
        - Allows the user to drag a disk image from the Finder onto the drive, and have it automatically mounted.
        - Allows the user to drag a disk image from one drive to another, unmounting it from the first, and mounting it on the second.
        - Displays LED's indicating drive accesses, and optionally, the sector

number accessed.

- Cassette

    - Shows the state of the cassette drive, and the name of the image file inserted, if any.
    - Allows the user to insert/eject a cassette image.
    - Allows the user to drag a cassette image from the Finder onto the drive, and have it automatically mounted.
    - Provides a graphical representation of the cassette tape position.
    - Allows the user to change the tape position (i.e. rewind/fast forward).

- Cartridge

    - Shows the state of the cartridge (inserted or empty), and the name of the image file inserted, if any.
    - Allows the user to insert/eject a cartridge.
    - Allows the user to drag a cartridge image from the Finder onto the drive, and have it automatically mounted.

- Added builtin Disk Image Editor. This editor allows you to edit ATR disk image files on a file level, importing/exporting files to/from the Mac filesystem, as well as deleting/renaming/locking/unlocking files, and creating/renaming/deleting directories on Atari DOS's which support them. Also, you can drag n' drop files to/from the disk images and the Mac Finder. Supported Atari DOS types are Atari DOS 1.0, Atari DOS 2.x, Atari DOS 3.0, Atari DOS 4.0, Atari DOS XE, TopDOS, BiboDos, MyDos, SpartaDos 2+, and BWDOS.
- Added Disk Image translations to Media Menu, under "Disk Image Utilities" menu item. User is able to translate ATR<->XFD and ATR<->DCM images.
- Added ability to drag 'n drop disk images, cartridge images, state files, and other recognized file types from the Finder to the emulator main window and have them loaded. This is in addition to the current ability to double click them, or drag them to the dock icon.
- Preferences which are also settable by menu options are now remembered between sessions, and change in the Preferences panel.
- Window positions are remembered between sessions.
- Sound capture format changed to AIFF from RAW for Mac compatibility.
- Screen capture format changed to TIFF from PCX for Mac compatibility.
- Added the ability to use the International key mapping setting in Mac OSX to remap the keyboard for other countries. Note, this option defaults to off, and must be set to on in the Atari System panel of the Preferences window.
- Added Sector number display to Disk LED status in main window, and the ability to turn both drive status and Sector number display off.
- Reworked confusing display menu scheme, making the choices much clearer.
- Added scanline option for scaling, where display simulates older monitors which had visable lines.

- Added smooth option for scaling. This applies a smoothing algoritm when scaling the screen. Note, this is highly CPU intensive, and may slow down the frame rate the emulator is capable of.
- Added the ability to display the frame rate while in Full Screen in the lower left corner of the screen.
- Added Console Sound (Keyclick) and Serio Sound (Disk read/write) to new "Hi-Fi" Sound Emulation. Also, these sounds may now be turned on and off in the System Tab of the Preferences.
- Added option key override of keyboard joysticks, so that normal Atari keys that are the same as joystick keys may be typed by holding down option and the key.
- Added the following features from Core Emulator version 1.3.2:
    - Casette handling greatly improved
    - 2 New cartridge types - Phoenix and Blizzard.
- Cleaned up Atari System Preferences window.
- Uses current SDL library for graphics.

Bugs Fixed:

- Fixed mouse emulation buttons. These were broken in version 1.6.
- Fixed annoying audio clicks on starting and ending the emulator, as well as when modal dialog boxes were displayed.
- Fixed bug in SIO emulation which was preventing formating of Disk Images in double density/enhanced density on some DOS types.
- Added the following fixes from Core Emulator version 1.3.2:
    - ANTIC and POKEY fixes for software compatibility
    - Some rare buffer overflows fixed

Version 1.6.0 Release 10-20-2003

Features Added/Changed:

The major change in this version was bringing the Atari800MacX source base up to the current release of the base Atari800 Emulator. This resulted in the following features:

- New Hi-Fi quality Sound Emulation. The old sound engine may still be used by unchecking the "Use Hi-Fi Sound" option on the System Panel of the Preferences Pane. Note the new sound engine does not yet implement the key click or input/output sounds. If you wish to have these sounds, the old sound engine must be selected.
- Updated Cycle-exact graphics emulation. Improved handling of DMACTL changes in the middle of a scanline ("Decathlon", "Mail Order Monsters"). Emulation of a DMACTL width change bug.
- Added Multijoy 4 Emulation - Allows the use of 4 joysticks on XL/XE machines with custom software.
- Added new cartridge type: Switchable XEGS 1 MB.
- Added Rotate Disk command to Media menu and Disk Management Dialog.
- Added XF551 HighSpeed transfer Emulation.
- Source code is now back in sync with Atari800 emulator.

(http://atari800.sourceforge.net)

Bugs Fixed:

- Fixed Atari 5200 crash after pressing SHIFT and * in "Super Pacman".
- Fixed crashing of emulator if disk or cartridge file specified in a Saved State file could not be found.

Version 1.5.0 Release 08-24-2003
Features Added/Changed:

- Added the ability to use a command key shortcut (Command-,) to display the Preferences panel.
- Added the ability to ignore the Header Write Protect Bit in ATR images. If this bit is set, the emulator is unable to write to the disk image. This prevented some demos and games from working, since the user had no way to set the disk image to read/write. (This feature was added under the Atari System Pane of the Preferences.)

Bugs Fixed:

- Fixed emulator sound mixing. This allows the emulator to be used with iTunes, etc., and not cause distortion of the music audio.

Version 1.4.0 Release 05-08-2003
Features Added/Changed:

- Changed the way gamepad button assignment is handled, so that different assignments can be given to different gamepads. This allows users who have different types of gamepads to use them, and assign the buttons differently. This change requires that any changes to the gamepad assignments be saved to a named configuration before the Preferences window is closed, or the changes will be lost. Then the named configuration must be selected for the gamepads on which it is to be used.
- Added the ability to use gamepad buttons as joystick directions, for gamepads which do not report hats, such as the iShock. Note, this change can cause an incompatability in the Preferences file with older versions of the program. If you use this new version, and wish to go back to an older version, make sure and set gamepad assignments to other than joystick directions, and joystick types to other than gamepad buttons before using the older version, or the Preferences file will cause a crash when the Preferences panel is opened.
- Increased the maximum number of gamepad buttons to 24 from 16, to handle devices such as the iShock.
- Added the ability to specify which joystick or hat to use for the controller on gamepads which have multiple sticks or hats.
- Cleaned up the Gamepad preferences panel, disabling menu items when they are not applicable.

Bugs Fixed:

- Fixed state file saving/loading with cartridges larger than 8k. WARNING: To implement this required a state file format change, so state files saved with earlier versions will not load into 1.4.0.
- Fixed gamepad button assignment, such that a button assigned to shift or control can be used in conjunction with another button assigned to a character. Note, that this will give the shifted equivelent on the Atari keyboard, not the Mac keyboard (i.e. Shift-8 will be ^, not *).
- Fixed issue which was preventing Rtime8 time emulation from working. (Bug is present in 1.2.0 and later).
- Fixed SDL bug which was causing Digital Hats to not work properly on gamepads (Up direction was flaky).
- Fixed bug introduced in 1.3.0, causing Mouse based emulation to not work.
- Fixed missing Atari key. Now able to type '|' character.

Version 1.3.0 Release 03-13-2003

Features Added/Changed:

- Added ANTIC/GTIA Cycle Exact code from Atari800 core emulator. This adds compatability with several games and demos. See Compatability page of program help for more detail.
- Added ability to save and load multiple Disk Sets from the Disk Management window. (Also from the Fullscreen UI). See the Media page of the program help for details.
- Ability to handle 4 USB Gamepads. This change will require users of earlier versions to respecify their joystick emulations.
- Added x3 Scaling and x4 Scaling on Windowed Display, and added the ability to lock Fullscreen display to 640x480 (on by default)
- Added Cartridge and Disk state information to State files. Now when loading a saved state, the cartridge and disks present when the state was saved will be mounted. The state file format has not changed, but the disk/cartridge info was added to the end.
- Added Backquote (`) as break key, in addition to Pause/F15.
- Added Known Bugs page to Help pages.
- Added Hot Key (F7) for "Limit to Normal Speed"
- Added Emulator message window, which is used to display debug and informational messages from the Emulator core. It can be found under the Control menu.

Bugs Fixed:

- Fixed Break key/Interrupt bug from Atari800 core emulator
- Fixed bug where Gamepad Joystick would stick in one or two directions, unless moved in the other direction. This bug would go away after a few mintues, but was very annoying :). (But amazing easy to fix...."I love it when a plan comes together" :)).
- Fixed bug with Boot Disk Images where only one or two images could be specified without crashing the program.

- Fixed bug where Atari Inverse, Clr-Tab, Set-Tab, Insert-Char, Insert-Line, Delete-Char, and Delete-Line keys were not recognized by the emulator.
- Moved Mouse Grab key(F12 to F11), as it conflicted with Optical Media Eject on non-Apple keyboards.
- Fixed BW/Color conversion bug in Pallette Formating code from core emulator.

Version 1.2.0 Release 01-14-2003
Features Added/Changed:

- Added ability to program keys used for keyboard emulation of joysticks.
- Completed subdirectory support for DOS functions for the hard drives. This support works best with Spartdos and BWDos, as it works with the command line in them, but will be supported by XIO functions with any DOS.
- Added support for AlphaOmega Software's Extended Software Updater, to allow user to find out about new versions of program.
- Fixed Folder Icons in Application Folder (Thanks Matt :)).

Bugs Fixed:

- Fixed issues with special key assignments on gamepads (Select, Option, Reset, Shift, Ctrl).
- Fixed issue with "Boot From Casette" preference change not taking after Prefs panel closed.
- Fixed issue where if Boot Disk was not found, application would quit.

Version 1.1.0 Release 12-03-2002
Features Added/Changed:

- Added full Gamepad control, alowing gamepad buttons to be assigned to Atari buttons/keypress, and selection of joysticks on gamepads with both Analog and Digital stcks.
- Added the capability to use the X-axis of an analog joystick or mouse for both paddles of a paddle set.
- Added 13 Cartridge types from Atari800 Emulator Core.
- Atari800MacX now supports all normal DOS functions for the hard drives, including Rename, Delete, Note, Point, and Open for modify (read/write). Subdirectories are not supported at this time, but may be in a future release.
- Changed command key shortcuts to follow Macintosh standards.
- 5200 Emulator without a cartridge now displays a screen indicating user should insert a cartrdige, instead of a blank screen.

Bugs Fixed:

- 5200 Emulator crashing after cartridge is removed.
- Machine type switching bugs when cartridge is changed.
- Bug fixes in libSDL graphics libarary.

- Bug fixes in Atari800 Emulator core.

Version 1.0.1 11-1-2002
First Non-Beta Release. Includes the following features and bug fixes:

Features Added/Changed:

- Full Stereo sound capability added (actually fixed), as well as several sound bug fixes. Sound is greatly improved.
- Emulation of printing thru Atari P: device fully supported, which allows printing to a text file opened by a program of your choice.
- Ported the Atari800 R: device drivers to allow you to "dial-in" to BBS software through telnet and a user specified port number. Many thanks to Daniel Noguerol for his hard work on the original and ported versions of the driver.
- Ability to load color palettes from external files, or generate your own custom palettes. As a black and white palette is one of the included files, ability to change to Black and White has been removed from the program.
- Monitor panel added. This allows the user to display emulated memory, registers, display lists, etc.
- Full 5200 Controller support added, including 2nd button and keypad. See Help Keyboard page for details.
- Mac analog joysticks now provide paddle input as well (for Super Breakout, etc.). They also provide true analog input for 5200 joysticks.
- 5200 emulation is now pasued until you insert a cartridge, since the real 5200 did not run without a cartridge. Also, it was causing an anoying crash cycle without the cartridge.

Bugs Fixed:

- Incorrect Machine Type and RAM size in Window Title at program startup.
- Many of theCartridge types were not being properly recognized.
- System ROMs and Boot media loading were not defaulting to the proper directories.
- Mouse joystick emulation in 5200 mode was not working properly.
- Changing the Disable Basic flag in preferences now performs a coldstart, implementing the change.

Version 0.2.1 10-6-2002
First full Macintosh version, including Preferences, Menus, Help, and other standard features.

Version 0.1.2 9-8-2002
Initial SDL version without Macintosh Interface.